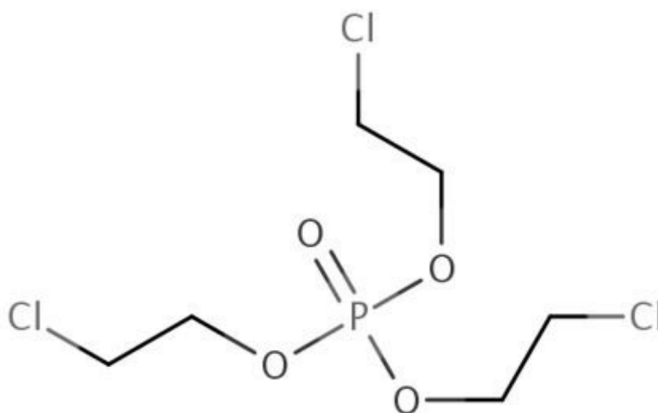


Risk Evaluation for Tris(2-chloroethyl) Phosphate (TCEP)

Systematic Review Supplemental File:

Data Quality Evaluation and Data Extraction Information for
Environmental Fate and Transport

CASRN: 115-96-8



September 2024

This supplemental file contains information regarding the data extraction and evaluation results for data sources that were considered for the *Risk Evaluation for Tris(2-chloroethyl) phosphate (TCEP)* and that underwent systematic review. EPA used the TSCA systematic review process described in the *Draft Systematic Review Protocol Supporting TSCA Risk Evaluations for Chemical Substances* (also referred to as the '2021 Draft Systematic Review Protocol'). The systematic review steps are further described in the *Risk Evaluation for Tris(2-chloroethyl) phosphate (TCEP) – Systematic Review Protocol*. EPA conducted data extractions and data quality evaluations based on author-reported descriptions and results; additional analyses (*e.g.*, statistical analyses) potentially conducted by EPA are not contained in this supplemental file. Additionally, the overall quality determination (OQD) for each reference represents the data as a whole for each study, and not for individual metric domains within a study.

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Study Citation:	SRI, (1975). Research program on hazard priority ranking of manufactured chemicals: Phase II - Final report, chemicals 61-79 (including 75A).
OECD Harmonized Template:	Photolysis in Air
HERO ID:	94568

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	none; not specified; other: not specified
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Duration and Test Temperature	NR; NR
Light Source, Intensity, and additional light details	NR; NR; NR
Source Wavelength Lower and Upper	NR; NR
Test Details and Control	NR; NR
Initial Concentration, Reference Compound	NR NR; Not Reported
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	NR; NR; NR
Indirect Type Results, Indirect Rate Constant Lower and Upper	reactive towards OH with a half-life = 100 days; Not Reported; Not Reported
Method Details Results and Products	Not Reported; Not Reported
Details Results	
Parameter Value and Parameter Results	Not Reported; Not Reported
Reference Substance Results, Percent Degradation Results and Standard	Not Reported; Not Reported; Not Reported
Deviation Results	
Results Remarks, Sample time Results, Results Details	Not Reported; Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	N/A	Rating of this factor is not applicable to this kind of information.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 4: Test Substance Stability	N/A	Rating of this factor is not applicable to this kind of information.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	N/A	Rating of this factor is not applicable to this kind of information.

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Study Citation:	SRI, (1975). Research program on hazard priority ranking of manufactured chemicals: Phase II - Final report, chemicals 61-79 (including 75A).			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	94568			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 7:	Testing Consistency	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 12:	Test Substance Purity	N/A	Rating of this factor is not applicable to this kind of information.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Rating of this factor is not applicable to this kind of information.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Uninformative	Limited detail with no primary citation.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination**Uninformative**

Study Citation:	Wei, G. L., Li, D. Q., Zhuo, M. N., Liao, Y. S., Xie, Z. Y., Guo, T. L., Li, J. J., Zhang, S. Y., Liang, Z. Q. (2014). Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environmental Pollution 196C:29-46.
OECD Harmonized Template:	Photolysis in Air
HERO ID:	2534603

Parameter	Data	EXTRACTION
CASRN and Test Material	115-96-8; tris(2chloroethyl) phosphate	
Confidentiality, Type, Guideline	None; not specified; None	
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR	
Radiolabel, Source, State, Purity	None; NR; NR; NR	
Duration and Test Temperature	not reported; not reported	
Light Source, Intensity, and additional light details	not reported; not reported; Not Reported	
Source Wavelength Lower and Upper	not reported; not reported	
Test Details and Control	Not Reported; not reported	
Initial Concentration, Reference Compound	not reported; not reported	
Substance Wavelength Lower and Upper	not reported; not reported	
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported	
Indirect Type Results, Indirect Rate Constant Lower and Upper	not reported; not reported; not reported	
Method Details Results and Products	Not Reported; Not Reported	
Details Results		
Parameter Value and Parameter Results	17.5 hours; atmospheric half-life	
Reference Substance Results, Percent Degradation Results and Standard	not reported; not reported; not reported	
Deviation Results		
Results Remarks, Sample time Results, Results Details	Not Reported; not reported; Not Reported	

Domain	Metric	EVALUATION	Comments	
		Rating		
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Low	Details regarding this metric were not reported in the secondary source.
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	Details regarding this metric were not reported in the secondary source.
	Metric 4:	Test Substance Stability	Low	Details regarding this metric were not reported in the secondary source.
Domain 3: Test Conditions				

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Study Citation:	Wei, G. L., Li, D. Q., Zhuo, M. N., Liao, Y. S., Xie, Z. Y., Guo, T. L., Li, J. J., Zhang, S. Y., Liang, Z. Q. (2014). Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environmental Pollution 196C:29-46.			
OECD Harmonized Template:	Photolysis in Air			
HERO ID:	2534603			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	Low	The test method was not reported for the test substance. This is a secondary source referencing non-original data.
	Metric 6:	Testing Conditions	Low	Conditions were not reported. This is a secondary source also referencing non-original data.
	Metric 7:	Testing Consistency	Low	Details regarding this metric were not reported in the secondary source.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	This is a secondary source also referencing non-original data.
	Metric 12:	Test Substance Purity	Low	Sampling method was not reported. This is a secondary source referencing non-original data.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	This is a secondary source referencing non-original data.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible. This is a secondary source referencing non-original data.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		Low		

* Related References: secondary source; the original data source is HEROID: 2598725 which is not entered in distiller and not original data.

Study Citation:	ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.
OECD Harmonized Template:	Hydrolysis
HERO ID:	3809216

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	Not Reported; Not Reported; other: Non-guideline
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported Notes: Not reported
Buffer, Test Temperature, Number of Replicates	Not reported; Not reported; Not reported
Positive Controls and Negative Controls	Positive: Not reported; Negative: Not reported
pH and Duration	3, 7, and 10; Not reported
Sampling Frequency and Test Setup	Not reported; Not reported
Concentration	Not reported -
Analytical Method, Analytical Details, and Statistics	Not reported; Not reported; Not reported
Transformation Products	Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported
Percent Recovery, Hydrolysis Rate Constant, and Half-life	Not reported; Not reported; At pH 7: 3980 days; At pH 3: no hydrolysis; At pH 10: 101 days
Results Remarks	Not Reported

Domain	Metric	EVALUATION Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by common nomenclature.
	Metric 2: Test Substance Purity	Medium	The test substance purity was not reported; however, the omission is unlikely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Study controls were not reported in the secondary report; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 4: Test Substance Stability	Medium	Details regarding the test substance preparation and storage conditions were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	Medium	The test method was not clearly described in the secondary report; however, the omission is unlikely to have a substantial impact on the study results.

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		EVALUATION		
Domain	Metric	Rating	Comments	
Study Citation:	ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.			
OECD Harmonized Template:	Hydrolysis			
HERO ID:	3809216			
	Metric 6:	Testing Conditions	Medium	Some details regarding the testing conditions were not reported in the secondary report; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Medium	Testing conditions across the study groups were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology was not reported by the secondary report; however, the omission is unlikely to have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Low	Some details regarding the sampling methods were not reported in the secondary report and the omissions may have an impact on the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported in the secondary source; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Details regarding the analytical method were not reported; however, the omissions were unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical methods and kinetic calculations were not reported in the secondary source and the omissions may have an impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	No reference substance was reported; however the study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Brown et al. (1975). Research program on hazard priority ranking of manufactured chemicals, Phase II - Final Report, Stanford Research Institute, PB-263164.

Study Citation:	Saint-Hilaire, D., Ismail, K. Z., Jans, U. (2011). Reaction of tris(2-chloroethyl)phosphate with reduced sulfur species. Chemosphere 83(7):941-947.
OECD Harmonized Template:	Hydrolysis
HERO ID:	2645418

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl)phosphate
Confidentiality, Type, Guideline	None; Experimental; other: TCEP pH dependent hydrolysis and abiotic reactions with reduced sulfur species
Solvent, Reactivity, Storage, Stability	Deoxygenated methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; TCI (Portland, OR); NR; 98.0% Notes: TCEP
Buffer, Test Temperature, Number of Replicates	50 mM buffer (sodium phosphate or sodium tetraborate) and 100 mM NaCl; 25°C, 50°C; Not reported
Positive Controls and Negative Controls	Positive: Not reported; Negative: Not reported
pH and Duration	8-13; Not reported
Sampling Frequency and Test Setup	throughout the course of the experiments; Reaction solutions prepared in controlled-atmosphere, anaerobic, glovebox using DI water. Reactions incubated in controlled temperature water baths.
Concentration	50 - 500 µmol/L
Analytical Method, Analytical Details, and Statistics	GC-FID; LC-MS-MS; Kinetics measured throughout by analysis of sample aliquots in ethyl acetate using GC-FID; kinetics and byproduct formation by adding glacial acetic acid drops to reaction samples then storing in freezer until analysis via LC-MS-MS; Stated uncertainties represent 95% confidence limits
Transformation Products	Bis(chloroethyl)phosphate was found to be the sole, stable hydrolysis product formed (and the main product via reaction with reduced sulfur agents)
Reference Substance and Reference Substance Results	Not reported; Not reported
Percent Recovery, Hydrolysis Rate Constant, and Half-life	Not reported; Second order rate constants (M ⁻¹ s ⁻¹) with polysulfides: 5.0±1.4E-4 (polysulfide dianions) 25°C; 34±2E-4 (thiopheolate) 0.89E-4 (bisulfide) at 50°C; Hydrolysis half-life=2 years, pH 8 and 25°C (estimated from exp at 50°C assuming AE=50 kJ/mol); half-life=90 days (bisulfide), 30 days (polysulfide anions) at pH 7.0 and 25°C
Results Remarks	hydrolysis rate increases with increasing pH

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Study controls were not included but this did not limit the interpretation of the results.
	Metric 4: Test Substance Stability	High	The test substance preparation was reported and was appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	Medium	Test details were limited; however, this will not likely effect the results.
	Metric 6: Testing Conditions	High	Temperature and pH were reported.
	Metric 7: Testing Consistency	High	This metric met the criteria for high confidence as expected for this type of study.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Saint-Hilaire, D., Ismail, K. Z., Jans, U. (2011). Reaction of tris(2-chloroethyl)phosphate with reduced sulfur species. Chemosphere 83(7):941-947.			
OECD Harmonized Template: Hydrolysis			
HERO ID: 2645418			
Domain 8: System Type and Design			
	Metric 8:	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms			
	Metric 9:	N/A	The metric is not applicable to this study type.
	Metric 10:	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
	Metric 11:	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control			
	Metric 13:	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 14:	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 8: Other			
	Metric 17:	Medium	The results were reasonable; however, no controls were included.
	Metric 18:	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High	

Study Citation:	SRI, (1975). Research program on hazard priority ranking of manufactured chemicals: Phase II - Final report, chemicals 61-79 (including 75A).
OECD Harmonized Template:	Hydrolysis
HERO ID:	94568

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	Not Reported; Not Reported; Not Reported
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Buffer, Test Temperature, Number of Replicates	Not Reported; Not Reported; Not Reported
Positive Controls and Negative Controls	Positive: Not Reported; Negative: Not Reported
pH and Duration	7.0; Not Reported
Sampling Frequency and Test Setup	Not Reported; Not Reported
Concentration	Not Reported
Analytical Method, Analytical Details, and Statistics	Not Reported; Not Reported; Not Reported
Transformation Products	Not Reported
Reference Substance and Reference Substance Results	Not Reported; Not Reported
Percent Recovery, Hydrolysis Rate Constant, and Half-life	Not Reported; 2.27E-9 1/molar*seconds at pH 7; 8.71E-8 1/molar*seconds at pH 1; log 3.6 days (log 2.0 days at pH = 1)
Results Remarks	Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	N/A	Rating of this factor is not applicable to this kind of information.
Domain 2: Test Design	Metric 3: Study Controls	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 4: Test Substance Stability	N/A	Rating of this factor is not applicable to this kind of information.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 6: Testing Conditions	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 7: Testing Consistency	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 8: System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.

Domain 4: Test Organisms

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Study Citation:	SRI, (1975). Research program on hazard priority ranking of manufactured chemicals: Phase II - Final report, chemicals 61-79 (including 75A).			
OECD Harmonized Template:	Hydrolysis			
HERO ID:	94568			
Domain	Metric	EVALUATION		Comments
	Metric 9:	Outcome Assessment Methodology	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 10:	Sampling Methods	N/A	Rating of this factor is not applicable to this kind of information.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 12:	Test Substance Purity	N/A	Rating of this factor is not applicable to this kind of information.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	N/A	Rating of this factor is not applicable to this kind of information.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Rating of this factor is not applicable to this kind of information.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Uninformative	Limited detail with no primary citation.
	Metric 18:	QSAR Models	N/A	Rating of this factor is not applicable to this kind of information.

Overall Quality Determination**Uninformative**

Study Citation:	Su, G., Letcher, R. J., Yu, H. (2016). Organophosphate flame retardants and plasticizers in aqueous solution: pH-dependent hydrolysis, kinetics, and pathways. Environmental Science and Technology 50(15):8103-8111.
OECD Harmonized Template:	Hydrolysis
HERO ID:	4568780

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: pH dependent hydrolysis kinetics of OP triesters
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	d12-TCEP prepared by and purchased from Dr. Vladimir Belov (MaxPlanck Institute for Biophysical Chemistry, Germany); Sigma-Aldrich (St. Louis, MO, U.S.A.); NR; $\geq 97\%$ Notes: TCEP
Buffer, Test Temperature, Number of Replicates	pH 7: 100 mM NaCl, 0.02% NaN ₃ ; pH 9: 100 mM NaCl, 0.1 mM NaOH, 0.02% NaN ₃ ; pH 11: 100 mM NaCl, 1 mM NaOH, 0.02% NaN ₃ ; pH 13: 100 mM NaOH, 0.02% NaN ₃ ; 20 \pm 1°C; Not reported
Positive Controls and Negative Controls	Positive: Not specified; Negative: Not specified
pH and Duration	7 (6.96 \pm 0.08), 9 (8.93 \pm 0.01), 11 (10.80 \pm 0.02), 13 (12.96 \pm 0.01); 35 days
Sampling Frequency and Test Setup	0 min, 15 min, 30 min, 1 h, 2 h, 4 h, 8 h, 1 d, 2 d, 4 d, 7 d, 14 d, 21 d, 28 d, and 35 d; glass tubes in water baths
Concentration	ng/mL 80 - ng/mL 80 ng/mL
Analytical Method, Analytical Details, and Statistics	UPLC-MS/MS with ESI; Waters XEVO-TQ-S ultra high performance liquid chromatography-tandem quadrupole mass spectrometer in the positive atmospheric pressure chemical ionization mode (UPLC-APCI(+)-MS/MS); LC-Q-TOF-MS for analysis of hydrolysis products; MDL not reported; $p < 0.0001$ for fitted linear curve; $r^2 > 0.93$
Transformation Products	Not Reported
Reference Substance and Reference Substance Results	Not reported; Not reported
Percent Recovery, Hydrolysis Rate Constant, and Half-life	Not reported; 8.36/day at pH 13; 0.083 days at pH 13; no significant degradation observed over 35 days at pH 7, 9, and 11
Results Remarks	pseudo-first-order kinetics

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design	Metric 3: Study Controls	Medium	A concurrent control was not explicitly included.
	Metric 4: Test Substance Stability	High	The test substance preparation was reported and was appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Test conditions were reported and monitored (pH and temperature).
	Metric 7: Testing Consistency	High	Test conditions were consistent across study groups.

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Study Citation:	Su, G., Letcher, R. J., Yu, H. (2016). Organophosphate flame retardants and plasticizers in aqueous solution: pH-dependent hydrolysis, kinetics, and pathways. Environmental Science and Technology 50(15):8103-8111.			
OECD Harmonized Template:	Hydrolysis			
HERO ID:	4568780			
Domain	Metric	EVALUATION		Comments
	Metric 8:	System Type and Design	Rating High	The system type and design were appropriate.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology reported the intended outcomes of interest.
	Metric 12:	Test Substance Purity	Medium	Sampling specifics were not reported; however, sample frequency was adequate for rate calculations.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	N/A	No variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Analytical MDL and mass balance not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were described and address the datasets.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		Medium		

Study Citation:	U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.
OECD Harmonized Template:	Hydrolysis
HERO ID:	5113326

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Study examining hydrolysis at a water treatment facility
Solvent, Reactivity, Storage, Stability	buffered water; No; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Buffer, Test Temperature, Number of Replicates	pH 2 to pH 12 with a chlorine concentration (100 mg/L) from calcium hypochlorate and hydrochloric acid; 20 deg C; NR
Positive Controls and Negative Controls	Positive: NR; Negative: NR
pH and Duration	10 to 12; 1 day
Sampling Frequency and Test Setup	NR; NR
Concentration	Not Reported
Analytical Method, Analytical Details, and Statistics	NR; Not Reported; NR
Transformation Products	NA
Reference Substance and Reference Substance Results	NR; NR
Percent Recovery, Hydrolysis Rate Constant, and Half-life	NR; None; Not Reported
Results Remarks	95% remained (5% hydrolysis) after 1 day at pH 10; 40% remained (60% hydrolysis)5% hydrolysis after 1 day at pH 12

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively
	Metric 2: Test Substance Purity	Low	The test substance source and purity were not reported in this secondary source.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Concurrent control group details were not reported.
	Metric 4: Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	Low	Test method was not identified, but likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 6: Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 7: Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.

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Study Citation:		U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.		
OECD Harmonized Template:		Hydrolysis		
HERO ID:		5113326		
Domain	Metric	EVALUATION Rating	Comments	
	Metric 8:	System Type and Design	Medium	System type and design is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported, more details may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical method is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	No statistical methods or kinetic calculations were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results appear reasonable, but lack detail.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**Medium**

* Related References: Data citing HERO ID 2919511 not yet in Distiller.

Study Citation:	U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.
OECD Harmonized Template:	Hydrolysis
HERO ID:	5113326

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Study examining hydrolysis at a water treatment facility
Solvent, Reactivity, Storage, Stability	buffered water; No; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Buffer, Test Temperature, Number of Replicates	pH 2 to pH 12 with a chlorine concentration (100 mg/L) from calcium hypochlorate and hydrochloric acid; 20 deg C; NR
Positive Controls and Negative Controls	Positive: NR; Negative: NR
pH and Duration	2 to 8; 1 day
Sampling Frequency and Test Setup	NR; NR
Concentration	Not Reported
Analytical Method, Analytical Details, and Statistics	NR; Not Reported; NR
Transformation Products	NA
Reference Substance and Reference Substance Results	NR; NR
Percent Recovery, Hydrolysis Rate Constant, and Half-life	NR; None; >1 day
Results Remarks	0% hydrolysis after 1 day; 100% of the chemical found at pH 2 to pH 8 after one day.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively
	Metric 2: Test Substance Purity	Low	The test substance source and purity were not reported in this secondary source.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Concurrent control group details were not reported.
	Metric 4: Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	Low	Test method was not identified, but likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 6: Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 7: Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 8: System Type and Design	Medium	System type and design is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.				
OECD Harmonized Template: Hydrolysis				
HERO ID: 5113326				
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported, more details may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical method is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	No statistical methods or kinetic calculations were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results appear reasonable, but lack detail.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		Medium		

* Related References: Data citing HERO ID 2919511

Study Citation:	Chen, Y., Ye, J., Chen, Y.,a, Hu, H.,an, Zhang, H., Ou, H. (2019). Degradation kinetics, mechanism and toxicology of tris(2-chloroethyl) phosphate with 185 nm vacuum ultraviolet. Chemical Engineering Journal 356:98-106.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5469302

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Not indicated
Solvent, Reactivity, Storage, Stability	NR; NR; Stored at required temperature (4°C or less); NR
Radiolabel, Source, State, Purity	NR; Toronto Research Chemicals (Canada); NR; 99% Notes: HPLC grade
Duration and Test Temperature	60 minutes; 25±2°C
Light Source, Intensity, and additional light details	Sole UV-C (254 nm); 254nm: 8mW/cm ² ; 185nm: 0.48 mW/cm ² ; Low pressure argon-mercury lamp with emission peaks at 185 nm and 254 nm
Source Wavelength Lower and Upper	185 nm; 254 nm
Test Details and Control	20-80 mL of TCEP solution placed in reaction vessel. pH was set to 6.5-7.2 using buffer. Tests were performed in triplicate.; pH 7, otherwise not well described
Initial Concentration and Reference Compound	3.51 µM; Not reported
Substance Wavelength Lower and Upper	Not reported; Not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not reported; Not reported
Indirect Rate Constant Lower and Upper	VUV (185 nm) k(app) = 1.65 ± 0.21x10 ⁻³ 1/s; k(OH-TCEP) = 3.2 ± 0.3x10 ⁻⁸ M ⁻¹ s ⁻¹ ; 254 nm showed no degradation.
Method Details Results and Products	Not Reported; Not Reported
Details Results	
Parameter Value and Parameter Results	Not Reported; k(app) = apparent reaction rate constant; k(OH-TCEP) = second order reaction rate constant
Reference Compound, Reference Substance Results, Percent Degradation Results and Standard Deviation Results	Not reported; Not reported; Negligible variation occurred from 254 nm irradiation only.; Standard deviations were shown via error bars and were approximately 10-15%.
Results Remarks, Sample time Results, Results Details	Degradation was attributed to both 185 nm photolysis and hydroxyl radical oxidation. Mineralization was incomplete via VUV with 35% TOC removed after 60 min reaction.; Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	No negative controls were reported but the omission does not have a substantial impact on the study results.
	Metric 4: Test Substance Stability	High	The test substance storage conditions, preparation, and homogeneity in the test were reported and appropriate.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Chen, Y., Ye, J., Chen, Y.,a, Hu, H.,an, Zhang, H., Ou, H. (2019). Degradation kinetics, mechanism and toxicology of tris(2-chloroethyl) phosphate with 185 nm vacuum ultraviolet. Chemical Engineering Journal 356:98-106.			
OECD Harmonized Template: Photolysis in Water			
HERO ID: 5469302			
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High Testing conditions between sample groups were consistent.
	Metric 8:	System Type and Design	N/A The metric is not applicable to the study type.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to the study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High The sampling methods and frequency were reported and appropriate.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	Medium The reported variability was not likely to influence the outcome of the study and no confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High The data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High A simple statistical analysis was reported. Kinetic results were described and appropriate.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High The study results are reasonable.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.
Overall Quality Determination		High	

Study Citation:	Ishikawa, S., Uchimura, Y., Baba, K., Eguchi, Y., Kido, K. (1992). Photochemical Behavior of Organic Phosphate Esters in Aqueous Solutions Irradiated with a Mercury Lamp. Bulletin of Environmental Contamination and Toxicology 49(3):368-374.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5164728

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Photochemical behavior and decomposition products in water with mercury lamp UV irradiation
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Tokyo Chemical Co; NR; Purified by distillation under reduced pressure; checked by GC Notes: TCEP
Duration and Test Temperature	6 hours; Not reported
Light Source, Intensity, and additional light details	mercury lamp; At 254, 297, and 365 nm intensity = 6.640-6.800, 0.140-0.143, and 0.153-0.158 mW/cm ² ; 15W low-pressure
Source Wavelength Lower and Upper	254; 365
Test Details and Control	pH 3 (adjusted with HCl); pH 10, 12 (adjusted with NaOH); Dark control not reported
Initial Concentration and Reference Compound	0.1 mg/L; 100% degradation after ca. 1 hour
Substance Wavelength Lower and Upper	Not reported; Not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not reported; Not reported
Indirect Rate Constant Lower and Upper	Not reported; Not reported
Method Details Results and Products	substrate disappearance over 6 hour period of irradiation; 64% phosphate ion, 68% chloride ion (pH not adjusted); 35% phosphate ion, 60% chloride ion (initial pH 12)
Details Results	
Parameter Value and Parameter Results	Not Reported; % degradation
Reference Compound, Reference	100% degradation after ca. 1 hour; Reference solution: pH not adjusted; pH after 6 hours = 2.8; 100% degradation after ca. 1 hour at all pH values;
Substance Results, Percent Degradation Results and Standard Deviation Results	Not reported
Results Remarks, Sample time Results, Results Details	pseudo-first-order kinetics; 6 hours; rate constant = 5.1/hour at pH 3 and 4.1/h at pH 10

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was definitively identified.
	Metric 2: Test Substance Purity	High	The test substance source and purification method reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Uninformative	A dark control was not included.
	Metric 4: Test Substance Stability	Medium	Test substance storage after purification was not reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.

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Study Citation:	Ishikawa, S., Uchimura, Y., Baba, K., Eguchi, Y., Kido, K. (1992). Photochemical Behavior of Organic Phosphate Esters in Aqueous Solutions Irradiated with a Mercury Lamp. Bulletin of Environmental Contamination and Toxicology 49(3):368-374.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5164728			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 6:	Testing Conditions	Medium	Temperature was not reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	N/A	The system reactor was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed the intended outcomes of interest for the study; however, environmentally relevant conditions were not applied.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical method was appropriate; however, limits of detection and extraction efficiency were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Uninformative	The results were unacceptable due to lack of dark control; other abiotic loss processes can not be ruled out, especially under highly alkaline and acidic conditions.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Uninformative**

Study Citation:	Lee, E., Shon, H. K., Cho, J. (2014). Role of wetland organic matters as photosensitizer for degradation of micropollutants and metabolites. Journal of Hazardous Materials 276(Elsevier):1-9.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4289979

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Indirect photolysis rates of TCEP in water
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (St. Louis, MO); NR; >97%
Duration and Test Temperature	24 hours; 25°C
Light Source, Intensity, and additional light details	UVC Lamp; 7.62 x 10 ⁻⁷ Einstein/min; UVC Lamp (Philips, TUV 4W/G4 T5, Holland)
Source Wavelength Lower and Upper	Not reported; 254nm
Test Details and Control	Double wall glass reactor with lamp on the inside. 300mL deionized water solution (pH 7.7, phosphate buffer) containing the test substance.; Dark controls were used to determine loss via hydrolysis.
Initial Concentration and Reference Compound	Not reported Not reported; Not reported
Substance Wavelength Lower and Upper	Not Reported; Not Reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not reported; Not reported
Indirect Rate Constant Lower and Upper	Not reported; <0.0001
Method Details Results and Products	Water 2695 Separations Module coupled with a Micromass Quattro Micro triple–quadrupole tandem mass spectrometer in electrospray ionization mode.; Not reported
Details Results	11/M cm (epsilon at 254 nm); /min
Parameter Value and Parameter Results	Not reported; Not reported; Not reported; Not reported
Reference Compound, Reference	Not reported; Not reported; Not reported; Not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	Not reported; Not reported; Not reported; Not reported
Results Remarks, Sample time Results, Results Details	Low indirect photodegradation rates for TCEP.; Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was definitively identified.
	Metric 2: Test Substance Purity	High	The test substance source and purity reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	A dark control was included to control for hydrolysis.
	Metric 4: Test Substance Stability	Medium	Test substance storage details were not reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.

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Study Citation:	Lee, E., Shon, H. K., Cho, J. (2014). Role of wetland organic matters as photosensitizer for degradation of micropollutants and metabolites. Journal of Hazardous Materials 276(Elsevier):1-9.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4289979			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Low	Temperature and pH were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across study groups.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Limited sampling details reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	The reported variability was not likely to influence the outcome of the study and no confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Quantitative results were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Details were not reported for TCEP, but were described in general.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Plausibility of results were minimally discussed in the report. Discussion was more focused on personal care targets.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Li, C., Wei, G., Chen, J., Zhao, Y., Zhang, Y. N., Su, L., Qin, W. (2018). Aqueous OH radical reaction rate constants for organophosphorus flame retardants and plasticizers: Experimental and modeling studies. 52(5):2790–2799.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	8673743

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Indirect photolysis
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Accustandard (New Haven, CT, U.S.A.); NR; Authentic standard Notes: TCEP
Duration and Test Temperature	up to 18 minutes; 25±1°C
Light Source, Intensity, and additional light details	mercury lamp; 500 W; water-refrigerated Hg lamp equipped with 290 nm cutoff filters
Source Wavelength Lower and Upper	Not reported; 290 nm
Test Details and Control	Hydroxyl radical was generated via UV/H2O2 system; methanol was used as the quenching agent; experiments performed in an XPA-7 merry-go-round photochemical reactor; system pH ca. 5.5; Controls included
Initial Concentration and Reference Compound	0.34 to 5 µM; atrazine
Substance Wavelength Lower and Upper	a distinct maximum was not observed in the UV-vis absorption spectra of this chemical; a distinct maximum was not observed in the UV-vis absorption spectra of this chemical
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not reported; Not reported
Indirect Rate Constant Lower and Upper	(4.30±0.32) × 10 ⁸ M ⁻¹ sec ⁻¹ ; Not reported
Method Details Results and Products	GC-FID and LC-MS/MS; Not reported
Details Results	
Parameter Value and Parameter Results	not specified; aqueous KOH
Reference Compound, Reference	atrazine; 2.6 x 10 ⁹ M ⁻¹ sec ⁻¹ ; Not reported; Not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Not reported; Not reported; predicted half-lives in natural water environments: 18.7 days based on OH radical concentration of 10 ⁻¹⁵ M; 18657.1 days based on OH radical concentration of 10 ⁻¹⁸ M

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The test substance source was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Various controls were included; a dark control was not included.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Li, C., Wei, G., Chen, J., Zhao, Y., Zhang, Y. N., Su, L., Qin, W. (2018). Aqueous oh radical reaction rate constants for organophosphorus flame retardants and plasticizers: Experimental and modeling studies. 52(5):2790–2799.			
OECD Harmonized Template: Photolysis in Water			
HERO ID: 8673743			
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were reported and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent.
	Metric 8: System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms			
	Metric 9: Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10: Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment			
	Metric 11: Test Substance Identity	High	The outcome assessment methodology was appropriate.
	Metric 12: Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control			
	Metric 13: Confounding Variables	High	All sources of variability were considered and were not likely to influence the results of the study.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis			
	Metric 15: Data Reporting	Medium	Mass balance and some analytical detail omitted. Specific rates constants and many details reported in the supplemental information.
	Metric 16: Statistical Methods and Kinetic Calculations	High	Kinetic calculations were clearly described in supplemental information
Domain 8: Other			
	Metric 17: Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18: QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High	

Study Citation:	Regnery, J., Püttmann, W. (2010). Occurrence and fate of organophosphorus flame retardants and plasticizers in urban and remote surface waters in Germany. <i>Water Research</i> 44(14):4097-4104.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5469263

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Photolysis in ultrapure and natural lake water, natural sunlight; Not Reported
Solvent, Reactivity, Storage, Stability	Methanol/acetonitrile (1/1 v/v); NR; NR; NR
Radiolabel, Source, State, Purity	NA; Sigma Aldrich, Steinheim, Germany; Aqueous solution; NR
Duration and Test Temperature	15 days; NR
Light Source, Intensity, and additional light details	Natural sunlight; Average = 251 W/m ² ; Not Reported
Source Wavelength Lower and Upper	NR; NR
Test Details and Control	Test systems were ultra pure water, Holzmaar lake water, and Holzmaar lake water sterilized with Hg(II). Test systems in 1L Teflon bottles were kept on the roof of the Geosciences Center.; Dark controls (black Teflon bottles)
Initial Concentration and Reference Compound	2 ug/L; NR
Substance Wavelength Lower and Upper	NR; NR
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not Reported; Not Reported; Not Reported
Indirect Rate Constant Lower and Upper	Not Reported; Not Reported
Method Details Results and Products	Samples extracted by SPE and analyzed by GC/MS.; NR
Details Results	
Parameter Value and Parameter Results	Not Reported; Test substance loss
Reference Compound, Reference	NR; NR; No degradation observed.; Not Reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	Recovered test substance varied within the standard deviation for all treatments and the controls.; Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source but not purity was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Dark controls were included and were within a valid range.
	Metric 4: Test Substance Stability	Medium	The test substance preparation was reported, storage was not reported.
Domain 3: Test Conditions			

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Study Citation:		Regnery, J., Püttmann, W. (2010). Occurrence and fate of organophosphorus flame retardants and plasticizers in urban and remote surface waters in Germany. Water Research 44(14):4097-4104.		
OECD Harmonized Template:		Photolysis in Water		
HERO ID:		5469263		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The test method was suitable and the test substance was tested below its limit of solubility.
	Metric 6:	Testing Conditions	Medium	Some testing conditions like temperature and water pH were not reported.
	Metric 7:	Testing Consistency	High	Testing conditions were consistent across study groups and replicates.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining photolytic loss.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were not reported in detail.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability and uncertainty were addressed by the relative standard deviation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate; extraction efficiency was not reported but was factored into data analysis. Raw data was reported graphically.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable as photolysis is not expected for this compound.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		High		

Study Citation:	Tang, T., Lu, G., Wang, R., Qiu, Z., Huang, K., Lian, W., Tao, X., Dang, Z., Yin, H. (2019). Rate constants for the reaction of hydroxyl and sulfate radicals with organophosphorus esters (OPEs) determined by competition method. <i>Ecotoxicology and Environmental Safety</i> 170:300-305.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5469207

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	none; experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): non-guideline: oxidation kinetics for reaction with hydroxyl radicals
Solvent, Reactivity, Storage, Stability	stock solution prepared in acetone; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Aladdin (Shanghai, China); NR; not reported; used w/o further purification Notes: NR
Duration and Test Temperature	7 hours; not reported
Light Source, Intensity, and additional light details	300W mercury lamp; not reported; not reported
Source Wavelength Lower and Upper	not reported; not reported
Test Details and Control	Reaction rate constants were determined in ultrapure water using UV/H ₂ O ₂ ; pH = 5.5±0.2; not reported
Initial Concentration and Reference Compound	2 mg/L; not reported
Substance Wavelength Lower and Upper	not reported; not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported
Indirect Rate Constant Lower and Upper	rate constant k (0.05 mL 30% H ₂ O ₂) = 3.24E-2/second; rate constant k (0.1 mL 30% H ₂ O ₂) = 3.53E-2/second
Method Details Results and Products	not reported; not reported
Details Results	
Parameter Value and Parameter Results	not reported; loss of test material; pseudo first-order kinetics
Reference Compound, Reference	not reported; not reported; not reported; not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	steady state concentration of free radicals (0.05 mL 30% H ₂ O ₂) = 1.60E-12 M and (0.1 mL 30% H ₂ O ₂) = 1.26E-12 M; not reported; Oxidation rate (bimolecular reaction rate constant) = 2.50E10/M-second

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	The source of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Low	Controls were not included.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported, and were appropriate for the study.

Domain 3: Test Conditions

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Study Citation:	Tang, T., Lu, G., Wang, R., Qiu, Z., Huang, K., Lian, W., Tao, X., Dang, Z., Yin, H. (2019). Rate constants for the reaction of hydroxyl and sulfate radicals with organophosphorus esters (OPEs) determined by competition method. <i>Ecotoxicology and Environmental Safety</i> 170:300-305.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5469207			
			EVALUATION	
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	Low	Limited detail regarding this metric.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Limited detail regarding this metric.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Analytical details were omitted.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however, no controls were included.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Medium**

Study Citation:	Watts, M. J., Linden, K. G. (2009). Advanced oxidation kinetics of aqueous trialkyl phosphate flame retardants and plasticizers. Environmental Science and Technology 43(8):2937-2942.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	5469220

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Second order reaction rates of TCEP with OH were calculated from UV/H2O2 and O3/H2O2 first order rates.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; ACROS (Geel, Belgium); NR; 97%
Duration and Test Temperature	Not reported; Not reported
Light Source, Intensity, and additional light details	Low pressure Hg UV lamp (General Electric #G15T8); Not reported; Direct photolysis of TCEP was measured and was determined to be insignificant.
Source Wavelength Lower and Upper	Primary wavelength: 253.7nm; Not reported
Test Details and Control	Irradiations were performed of TCEP in laboratory grade deionized water and model surface water (pH 6.8; dissolved OC: 2.0 mg/L; NO3-: 0.3 mg/L; HCO3-: 30 mg/L; (PO4)3-, 1.0 mg/L; contained Suwanee River humic acid extract and alginic acid). Experiments without ozone had an initial [H2O2] of 50 mg/L. In ozone experiment, [H2O2] was increased from 0.45-7.5 mg/L and added [O3] was 0.38-6.37 mg/L.; Not reported
Initial Concentration and Reference Compound	TCEP: 5µM; Nitrobenzene (reference): 5µM µM; Nitrobenzene
Substance Wavelength Lower and Upper	Not reported; Not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not reported; Not reported; Insignificant loss observed by direct photolysis.
Indirect Rate Constant Lower and Upper	Not reported; Second order rate constant using combined UV/H2O2 and O3/H2O2 rate constants: $5.60 \pm 0.21 \times 10^8$ (M ⁻¹ s ⁻¹), O3 first order rate with TCEP: 0.3 min ⁻¹ in 9 mg/L O3 solution.
Method Details Results and Products	Gas chromatography-mass spectrometry (Single ion mode).; Not reported
Details Results	
Parameter Value and Parameter Results	Not Reported; Nitrobenzene was used as the only other OH scavenger in TCEP solutions. The linear correlation between the decay rate of Nitrobenzene and TCEP represented the ratio of the respective OH rate constants.
Reference Compound, Reference	Nitrobenzene; Not reported; Not reported; RSD%: 3.8
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	In surface water samples with UV fluences up to 1000 mJ/cm ² , TCEP degradation was low or not observed. 50% degradation was achieved with 1000 mJ/cm ² UV fluence and 50 mg/L H2O2.; Not reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3:	Study Controls	Medium Study blanks were not reported but the omission is unlikely to have a substantial impact on the study results.

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Study Citation:	Watts, M. J., Linden, K. G. (2009). Advanced oxidation kinetics of aqueous trialkyl phosphate flame retardants and plasticizers. Environmental Science and Technology 43(8):2937-2942.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	5469220			
	EVALUATION			
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	High	The test substance preparation was reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	There were no reported differences in testing conditions among the study groups.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Some of the details regarding the sampling methods were not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No confounding variables were noted in the study and uncertainty was reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The data reporting was appropriate and the analytical method was suitable for detection and quantification of the test substance.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical methods and kinetic calculations were clearly reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Watts, M. J., Linden, K. G. (2008). Photooxidation and subsequent biodegradability of recalcitrant tri-alkyl phosphates TCEP and TBP in water. Water Research 42(20):4949-4954.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	622538

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): Indirect photolysis by reaction with hydroxy radicals generated from UV + H2O2
Solvent, Reactivity, Storage, Stability	Carbonate buffer; NR; NR; NR
Radiolabel, Source, State, Purity	NR; ACROS; NR; 97%
Duration and Test Temperature	<1 hour; Not regulated
Light Source, Intensity, and additional light details	Hg lamps; 254 nm; 4 low-pressure Hg lamps
Source Wavelength Lower and Upper	Not applicable; Not applicable
Test Details and Control	Test compound and 50 mg/L H2O2 continuously mixed; total volume 150 mL; carbonate buffer - soft lake water; anions: HCO3-; Cl-; SO4 2-; Ca 2+; Mg 2+; Na +; UV irradiated solutions without H2O2 and untreated TCEP solutions
Initial Concentration and Reference Compound	5 mg/L; Not reported
Substance Wavelength Lower and Upper	Not reported; Not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	Not applicable; Not applicable; Not applicable
Indirect Rate Constant Lower and Upper	Not applicable; Not applicable
Method Details Results and Products	Residual extracted from 1 mL UV-H2O2 treated solution with 1 mL chloroform via rapidly mixed-liquid-liquid extraction. GC-MS; 90-100%
Details Results	indirect photolysis was achieved with addition of 50 mg/L H2O2 and application of 6000 mJ/sq cm; resulted in H+ and Cl- release
Parameter Value and Parameter Results	1/cm dm ³ 1/mol (by max epsilon); Not applicable
Reference Compound, Reference	Not reported; Not applicable; 0; Not applicable
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	No direct photolysis was observed; Not applicable; Poor light absorber in the UV-C range (200-300 nm, <5-M/cm)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was definitively identified.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Concurrent negative controls were included.
	Metric 4: Test Substance Stability	High	The test substance stability, homogeneity, preparation, and storage conditions were reported, and were appropriate for the study.

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Study Citation:	Watts, M. J., Linden, K. G. (2008). Photooxidation and subsequent biodegradability of recalcitrant tri-alkyl phosphates TCEP and TBP in water. Water Research 42(20):4949-4954.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	622538			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups. The conditions of the exposure were documented.
	Metric 8:	System Type and Design	N/A	System type and design was reported, and appropriate for the method.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed and no notable uncertainties or limitations were expected to influence results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Solution temperature was not regulated but was considered in the test system.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentration, extraction efficiency, percent recovery, or mass balance was reported, analytical methods used were suitable for detection and quantification of the target chemical and for degradation studies, sufficient evidence was presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Some details were omitted; however, these omissions were not likely to have had a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Xu, X., Chen, J., Qu, R., Wang, Z. (2017). Oxidation of Tris (2-chloroethyl) phosphate in aqueous solution by UV-activated peroxymonosulfate: Kinetics, water matrix effects, degradation products and reaction pathways. Chemosphere 185:833-843.
OECD Harmonized Template:	Photolysis in Water
HERO ID:	4350036

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	Not Reported; Not Reported; EPA OTS 796.3700 (Direct Photolysis Rate in Water by Sunlight): non-guideline: aqueous photolysis
Solvent, Reactivity, Storage, Stability	ultrapure water; NR; Stock solutions of TCEP (1.0 g/L) prepared in ultrapure water (18.2 MU cm) from a Millipore Super-Q water system and stored in amber glass bottles at 4°C; NR
Radiolabel, Source, State, Purity	NR; Jinan Tyrone Plastic Technology Co., Ltd. (Shandong, China); solution; >98% Notes: TCEP
Duration and Test Temperature	30 minutes; 25±2°C
Light Source, Intensity, and additional light details	500W mercury lamp; 15.5 mW/cm ² ; not reported
Source Wavelength Lower and Upper	not reported; not reported
Test Details and Control	pH = 5.5±0.5; sampling times: 0, 1, 2, 4, 8, 16 and 30 min; Data reported here is for the control run during the study; additional experiments run with variable concentrations of peroxymonosulfate as an oxidant
Initial Concentration and Reference Compound	1 mg/L; not reported
Substance Wavelength Lower and Upper	not reported; not reported
Direct Quantum Yield Results, Direct Half Life by Loss Lower and Upper	not reported; not reported; not reported
Indirect Rate Constant Lower and Upper	not reported; not reported
Method Details Results and Products	GC (recovery >99%); not reported
Details Results	
Parameter Value and Parameter Results	4.5% removal; removal of test material from aqueous solution
Reference Compound, Reference	not reported; not reported; 4.5%/30 minutes; not reported
Substance Results, Percent Degradation Results and Standard Deviation Results	
Results Remarks, Sample time Results, Results Details	not reported; 30 minutes; Transformation pathways include radical addition and C-O bond cleavage

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified clearly.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The metric is not applicable to this study.
	Metric 4:	Test Substance Stability	High	The test substance preparation, and storage conditions were reported.
Domain 3: Test Conditions				

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Study Citation:	Xu, X., Chen, J., Qu, R., Wang, Z. (2017). Oxidation of Tris (2-chloroethyl) phosphate in aqueous solution by UV-activated peroxydisulfate: Kinetics, water matrix effects, degradation products and reaction pathways. Chemosphere 185:833-843.			
OECD Harmonized Template:	Photolysis in Water			
HERO ID:	4350036			
			EVALUATION	
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Limited detail regarding the methodology; however, the % loss was reported and additional detail may be in supporting documents.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Limited detail regarding this metric; however, additional detail may be in supporting documents.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited detail regarding this metric; however, additional detail may be in supporting documents.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study.
Overall Quality Determination			High	

Study Citation: ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.
OECD Harmonized Template: Biodegradation in Water
HERO ID: 3809216

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; Ready biodegradability; Experimental; OECD Guideline 301 B (Ready Biodegradability: CO2 Evolution Test)
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported Notes: Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	Aerobic; Not Reported: Not reported
Duration, Parameter, System, and Sampling Frequency	28 days; Test material: Flasks with aeration tube, magnetic stirrers, and outlet to gas-absorption bottle (based on OECD 301 B description of method). ; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	10 - 20 mg/L
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Aerated; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	Not reported; DOC and CO2; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	DOC removal: 13% at 10mg/L TCEP and 4% at 20 mg/L TCEP. % of ThCO2 production: =<1% at both 10 and 20 mg/L TCEP.; Not reported; 28 days; Not reported
Results Remarks and Results Details	Not reported; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3: Study Controls	Medium	The use of controls was not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.
	Metric 4: Test Substance Stability	Medium	Details regarding the test substance preparation and storage conditions were not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.			
OECD Harmonized Template: Biodegradation in Water			
HERO ID: 3809216			
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	Testing conditions were not reported by the secondary source; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7: Testing Consistency	Medium	Testing condition consistency was not reported by the secondary source; however, the omission is unlikely to have a substantial impact on the study results.
	Metric 8: System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms			
	Metric 9: Outcome Assessment Methodology	Medium	Details regarding the inoculum type were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 10: Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment			
	Metric 11: Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12: Test Substance Purity	Medium	Some details regarding the sampling method were not reported; however, the omissions are unlikely to have a substantial impact on the study results due to the guideline followed.
Domain 6: Confounding/Variable Control			
	Metric 13: Confounding Variables	Low	Sources of variability and uncertainty were not discussed.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis			
	Metric 15: Data Reporting	Medium	Some details regarding the analytical method were not reported in the secondary report; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 16: Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported in the secondary source but are likely to be appropriate based on the guideline followed.
Domain 8: Other			
	Metric 17: Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18: QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Akzo Chemicals (1990a). LSR rept. 90/AKL 023/0230 (unpubl.)

Study Citation:	ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	3809216

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; Ready biodegradability; Experimental; OECD Guideline 302 B (Inherent biodegradability: Zahn-Wellens/EMPA Test)
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported Notes: Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	Aerobic; activated sludge, industrial (adaptation not specified)
Duration, Parameter, System, and Sampling Frequency	27 days; Not reported; Not reported; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	Not Reported
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and	Not reported; Not reported; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	<10% elimination; Not reported; 27 days; Not reported
Results Remarks and Results Details	Not reported; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	The use of controls was not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance preparation and storage conditions were not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.
Domain 3: Test Conditions				

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Study Citation:		ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		3809216		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Testing conditions were not reported by the secondary source; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Medium	Testing condition consistency was not reported by the secondary source; however, the omission is unlikely to have a substantial impact on the study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Details regarding the inoculum type were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Medium	Some details regarding the sampling method were not reported; however, the omissions are unlikely to have a substantial impact on the study results due to the guideline followed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty were not discussed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details regarding the analytical method were not reported in the secondary report; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported in the secondary source but are likely to be appropriate based on the guideline followed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Hoechst AG (1985). Rept. W 84-537 (unpubl.)

Study Citation:	ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	3809216

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; Ready biodegradability; Experimental; OECD Guideline 302 B (Inherent biodegradability: Zahn-Wellens/EMPA Test)
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported Notes: Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	Aerobic; activated sludge, industrial (adaptation not specified)
Duration, Parameter, System, and Sampling Frequency	21 days; Not reported; Not reported; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	Not Reported
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and	Not reported; Not reported; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	15%; Not reported; 21 days; Not reported
Results Remarks and Results Details	15% total elimination, 11% after 1h could be accounted to adsorption.; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	The use of controls was not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance preparation and storage conditions were not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.
Domain 3: Test Conditions				

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Study Citation:		ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		3809216		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Testing conditions were not reported by the secondary source; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Medium	Testing condition consistency was not reported by the secondary source; however, the omission is unlikely to have a substantial impact on the study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Details regarding the inoculum type were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Medium	Some details regarding the sampling method were not reported; however, the omissions are unlikely to have a substantial impact on the study results due to the guideline followed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty were not discussed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details regarding the analytical method were not reported in the secondary report; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported in the secondary source but are likely to be appropriate based on the guideline followed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Hoechst AG (1978). Rept. 6/78 (unpubl.)

Study Citation:	ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	3809216

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; Ready biodegradability; Experimental; ISO 11734 Water quality - Evaluation of the "ultimate" anaerobic biodegradability of organic compounds in digested sludge - Method by measurement of the biogas production
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported Notes: Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	Anaerobic; Not Reported: From the guideline: a mixture of the settled phases of sewage and activated sludge, which have been incubated in an anaerobic digester at about 35°C.
Duration, Parameter, System, and Sampling Frequency	58 days; DOC: Not reported; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	80 - mg/L
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	Not reported; DOC; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	No degradation was observed; Not reported; 58 days; Not reported
Results Remarks and Results Details	Not reported; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	Medium	The use of controls was not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance preparation and storage conditions were not reported in the secondary source; however, based on the guideline followed the omission is unlikely to impact the study result.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.				
OECD Harmonized Template: Biodegradation in Water				
HERO ID: 3809216				
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Testing conditions were not reported by the secondary source; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Medium	Testing condition consistency was not reported by the secondary source; however, the omission is unlikely to have a substantial impact on the study results.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Details regarding the inoculum type were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Medium	Some details regarding the sampling method were not reported; however, the omissions are unlikely to have a substantial impact on the study results due to the guideline followed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty were not discussed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details regarding the analytical method were not reported in the secondary report; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported in the secondary source but are likely to be appropriate based on the guideline followed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Noack (1993). Project N° 930818HH (unpubl.).

Study Citation:	ECHA, (2023). Tris(2-chloroethyl) phosphate - Biodegradation in water: Screening tests.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	11581706

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	None; ready biodegradability; experimental; OECD Guideline 301 C (Ready Biodegradability: Modified MITI Test (I))
Solvent, Reactivity, Storage, Stability	None; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	aerobic; activated sludge (adaptation not specified): Concentration of sludge = 30ppm
Duration, Parameter, System, and Sampling Frequency	4 weeks; Not reported; Not reported; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	100 - mg/L
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and	Not Reported; TOC removal; Not reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	0; Not reported; 4 weeks; Not reported
Results Remarks and Results Details	Not readily biodegradable; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: ECHA, (2023). Tris(2-chloroethyl) phosphate - Biodegradation in water: Screening tests.				
OECD Harmonized Template: Biodegradation in Water				
HERO ID: 11581706				
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with some details not reported.
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium	Limited detail in this secondary source; additional information may be in source cited.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods of the outcome were not fully reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty were not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Details regarding the results were not reported but may be available in the cited reference.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported; more information may be in the source cited.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**Medium**

* Related References: NITE (1983) citing Reference to the Official Bulletin of Economy, Trade and Industry. Tris(2-chloroethyl) phosphate. Class-Reference No.:2-1941. Class-Cabinet Order No. (PRTR) 1-352. Reported in the Chemical Risk Information Platform (CHRIP).

Study Citation:	ECHA, (2023). Tris(2-chloroethyl) phosphate - Biodegradation in water: Screening tests.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	11581706

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	None; ready biodegradability; experimental; OECD Guideline 301 C (Ready Biodegradability: Modified MITI Test (I))
Solvent, Reactivity, Storage, Stability	None; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	aerobic; activated sludge (adaptation not specified): Concentration of sludge = 30ppm
Duration, Parameter, System, and Sampling Frequency	4 weeks; Not reported; Not reported; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	100 - mg/L
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and	Not Reported; O2 consumption; Not reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	4; Not reported; 4 weeks; Not reported
Results Remarks and Results Details	Not readily biodegradable by BOD; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				

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Study Citation:		ECHA, (2023). Tris(2-chloroethyl) phosphate - Biodegradation in water: Screening tests.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		11581706		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with some details not reported.
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium	Limited detail in this secondary source; additional information may be in source cited.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods of the outcome were not fully reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty were not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Details regarding the results were not reported but may be available in the cited reference.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported; more information may be in the source cited.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination**Medium**

* Related References: NITE (1983) citing Reference to the Official Bulletin of Economy, Trade and Industry. Tris(2-chloroethyl) phosphate. Class-Reference No.:2-1941. Class-Cabinet Order No. (PRTR) 1-352. Reported in the Chemical Risk Information Platform (CHRIP).

Study Citation:	ECHA, (2023). Tris(2-chloroethyl) phosphate - Biodegradation in water: Screening tests.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	11581706

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	None; ready biodegradability; experimental; OECD Guideline 301 C (Ready Biodegradability: Modified MITI Test (I))
Solvent, Reactivity, Storage, Stability	None; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	aerobic; activated sludge (adaptation not specified): Concentration of sludge = 30ppm
Duration, Parameter, System, and Sampling Frequency	4 weeks; Not reported; Not reported; Not reported
pH Adjusted and pH	Not reported; Not reported
Concentration	100 - mg/L
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and	Not Reported; HPLC analysis; Not reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	1; Not reported; 4 weeks; Not reported
Results Remarks and Results Details	Not readily biodegradable by HPLC; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The source and purity of the test substance were not reported; however, HPLC analysis used.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Some concurrent control group details were not included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions			

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Study Citation:		ECHA, (2023). Tris(2-chloroethyl) phosphate - Biodegradation in water: Screening tests.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		11581706		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with some details not reported.
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium	Limited detail in this secondary source; additional information may be in source cited.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types and appropriate.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods of the outcome were not fully reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty were not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Limited data is reported in the secondary source but study data are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were not reported; more information may be in the source cited.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination		High		

* Related References: NITE (1983) citing Reference to the Official Bulletin of Economy, Trade and Industry. Tris(2-chloroethyl) phosphate. Class-Reference No.:2-1941. Class-Cabinet Order No. (PRTR) 1-352. Reported in the Chemical Risk Information Platform (CHRIP).

Study Citation:	Kawagoshi, Y., Nakamura, S., Fukunaga, I. (2002). Degradation of organophosphoric esters in leachate from a sea-based solid waste disposal site. Chemosphere 48(2):219-225.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5162793

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; other: Biodegradation study using leachate from waste disposal sites
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Blank and Control	autoclaved distilled water, pond water and sediment; Not reported
Oxygen and Inoculum	aerobic; other:: leachate from a sea-based solid waste disposal site at Osaka North Port
Duration, Parameter, System, and Sampling Frequency	75 day approximately; test mat.: Closed bottle; 12 times over 75 days, approximately
pH Adjusted and pH	Not Reported; 7.6 and 8.1
Concentration	0.1 mg/L
Composition and Test Temperature	Not reported; 20°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; air pump used in 2 trials; no; Run in the shade, outside
Results Details Method, Results per Degradation Parameter, and	GC-FPD; concentration of test substance; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	Below detection limit after 60 days in oxidation pond water and sediment sample runs; Not reported; 75 days; Some removal of test substance was found in the sterilized and blank controls
Results Remarks and Results Details	Test substance was removed from solution; Raw data presented with out removal rates
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	Medium	The test substance source and purity was not reported; however, the test substance was measured analytically.
Domain 2: Test Design			
	Metric 3: Study Controls	High	A concurrent negative control, or blank group was included.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: Kawagoshi, Y., Nakamura, S., Fukunaga, I. (2002). Degradation of organophosphoric esters in leachate from a sea-based solid waste disposal site. Chemosphere 48(2):219-225.				
OECD Harmonized Template: Biodegradation in Water				
HERO ID: 5162793				
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some testing condition were omitted; however, omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Medium	Some system type and design details were omitted; however, omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The test organism, species, or inoculum source were reported, but are not routinely used for similar study types; however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium	Minor limitations were identified in sampling methods of the outcome(s) of interest were reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered but not accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	Kawagoshi, Y., Nakamura, S., Fukunaga, I. (2002). Degradation of organophosphoric esters in leachate from a sea-based solid waste disposal site. Chemosphere 48(2):219-225.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5162793

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Kawagoshi, Y., Nakamura, S., Fukunaga, I. (2002). Degradation of organophosphoric esters in leachate from a sea-based solid waste disposal site. Chemosphere 48(2):219-225.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5162793

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; other: Biodegradation study using leachate from waste disposal sites
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Blank and Control	autoclaved leachate; Not reported
Oxygen and Inoculum	anaerobic; other:: leachate from a sea-based solid waste disposal site at Osaka North Port
Duration, Parameter, System, and Sampling Frequency	60 days; test mat.: Closed bottle; 1 times after 60 days
pH Adjusted and pH	Not Reported; 7.6 and 8.1
Concentration	0.1 mg/L
Composition and Test Temperature	Not reported; 20°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not applicable; yes; dark room
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	GC-FPD; concentration of test substance; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	No decrease in test substance concentration; Not reported; 60 days; Some removal of test substance was found in the sterilized and blank controls
Results Remarks and Results Details	Not Reported; Raw data presented without removal rates
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity was not reported; however, the test substance was measured analytically.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	A concurrent negative control, or blank group was included.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				

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Study Citation:	Kawagoshi, Y., Nakamura, S., Fukunaga, I. (2002). Degradation of organophosphoric esters in leachate from a sea-based solid waste disposal site. Chemosphere 48(2):219-225.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5162793			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some testing condition were omitted; however, omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Medium	Some system type and design details were omitted; however, omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The test organism, species, or inoculum source were reported, but are not routinely used for similar study types; however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium	Minor limitations were identified in sampling methods of the outcome(s) of interest were reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups were considered but not accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Medium**

Study Citation:	Life Sciences Research Ltd, (1990). Fyrol FR-2: Assessment of its ready biodegradability. Modified Sturm test.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	6310864

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; ethanol, 2-chloro-phosphate
Confidentiality, EndPoint, Type, Guideline	None; ready biodegradability; Experimental; OECD Guideline 301 D (Ready Biodegradability: Closed Bottle Test): inhibition test according to OECD 301D
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Akzo Chemicals Inc.; NR; NR
Blank and Control	control blanks included; Fyrol CEF inhibited sludge respiration at levels above 1 g/L
Oxygen and Inoculum	aerobic; activated sludge, domestic, non-adapted: aerated prior for 4 hours; mixed liquor homogenized and filtered
Duration, Parameter, System, and Sampling Frequency	3h; other: stoppered glass vessels; Day 3, 4, 6, 9, 13, 18, 21, 27, and 28
pH Adjusted and pH Concentration	Not Reported; 8.03-8.34 (preliminary), 8.10-8.57 (final) 0.56 - 10 g/L
Composition and Test Temperature	mineral salts medium; 18.2-19C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; carbon filtered tap water; Not reported; Not reported
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	Not reported; %inhibition based on specific respiration rates of the mean control respiration rate; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	preliminary test: 71% at 1 g/L and 13% at 10 g/L; final test: 14% at 10 g/L; Not reported; Not reported; results valid
Results Remarks and Results Details	not degradable under the test conditions; Fyrol CEF was not inhibitory at levels up to 100 mg/L; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Controls were included.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable.

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Study Citation:		Life Sciences Research Ltd, (1990). Fyrol FR-2: Assessment of its ready biodegradability. Modified Sturm test.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		6310864		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	High	Test conditions were appropriate.
	Metric 7:	Testing Consistency	High	Testing was consistent.
	Metric 8:	System Type and Design	High	The system was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	Inoculum was appropriate.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Assessment methodology was intended to address microbial inhibition.
	Metric 12:	Test Substance Purity	High	Sampling intervals were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable, but not specifically biodegradation.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High		

Study Citation:	Life Sciences Research Ltd, (1990). Fyrol CEF: Assessment of its ready biodegradability. Modified Sturm test.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	6310865

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; ready biodegradability; Experimental; OECD Guideline 301 B (Ready Biodegradability: CO2 Evolution Test)
Solvent, Reactivity, Storage, Stability	Aqueous; NR; Glass bottle; NR
Radiolabel, Source, State, Purity	NR; Akzo Chemicals International BV, The Netherlands; Liquid; NR
Blank and Control	Inoculated mineral salts medium; Sodium benzoate + 2 or 10 mg/L test substance
Oxygen and Inoculum	aerobic; activated sludge, domestic (adaptation not specified): Collected from domestic sewage treatment works, mixed liquor homogenized and filtered aliquot of supernatant used as inoculum
Duration, Parameter, System, and Sampling Frequency	28 days; test mat.: 5L brown glass carboys with mineral salts medium and 1% bacterial inoculum, sealed with stopper. Three sequential barium hydroxide traps used for CO ₂ .; 0, 28d
pH Adjusted and pH	Not Reported; 7.23 - 7.25 (start), 6.87 - 7.38 (end)
Concentration	10 - 20 mg/L
Composition and Test Temperature	Mineral salts medium: KH ₂ PO ₄ , K ₂ HPO ₄ , Na ₂ HPO ₄ *2H ₂ O, MgSO ₄ *7H ₂ O, CaCl ₂ *2H ₂ O, FeCl ₃ *6H ₂ O, NH ₄ Cl, (NH ₄) ₂ SO ₄ ; 19.0 - 23.0°C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not Reported; Vessels continuously flushed with CO ₂ free air, 30 - 40 mL/min.
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	Samples for DOC analysis filtered and acidified with 0.5N phosphoric acid and sparged with N ₂ .; DOC; Not Reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	13% (10 mg), 4% (20mg); Not reported; 28 days; 60% ThCO ₂ /6d, 89%ThCO ₂ /28d
Results Remarks and Results Details	Not readily biodegradable. Results blank-corrected. Negligible CO ₂ production at 28d (max 0.6 mg CO ₂). Control CO ₂ production 18.9 mg/28d, meets the validity criteria of < 50 mg CO ₂ .No bacterial inhibition was observed in10-d inhibition replicate (36-38% thOD of reference substance); Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name and CASRN.
	Metric 2: Test Substance Purity	Medium	The test substance source but not purity was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Blanks and reference substance were included and met the validity criteria.
	Metric 4: Test Substance Stability	Medium	Test substance preparation but not storage was reported.

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Study Citation:	Life Sciences Research Ltd, (1990). Fyrol CEF: Assessment of its ready biodegradability. Modified Sturm test.		
OECD Harmonized Template:	Biodegradation in Water		
HERO ID:	6310865		
		EVALUATION	
Domain	Metric	Rating	Comments
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method followed OECD guidelines.
	Metric 6:	Testing Conditions	High Appropriate test conditions (temperature, pH) were monitored and reported.
	Metric 7:	Testing Consistency	High Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	N/A Not applicable.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	High The inoculum source and type was reported and is used for similar study.
	Metric 10:	Sampling Methods	N/A Not applicable.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology was appropriate for determining biodegradation.
	Metric 12:	Test Substance Purity	Medium Sampling methods were appropriate, but samples were only collected at test start and end.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A Not applicable.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	Medium Test substance recovery or mass balance was not reported. Raw data was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A Statistical or kinetic calculations were not applied.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High the results were reasonable based on meeting the validity criteria of an OECD guideline method.
	Metric 18:	QSAR Models	N/A Not applicable.

Overall Quality Determination**High**

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	6629833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; screening test; Experimental; other: Japanese MITI test
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Blank and Control	Not reported; Not reported
Oxygen and Inoculum	aerobic; activated sludge (adaptation not specified): Activated sludge concentration: 30 mg/L
Duration, Parameter, System, and Sampling Frequency	4 weeks; ThOD: Not reported; Not reported
pH Adjusted and pH	Not Reported; Not reported
Concentration	100 mg/L
Composition and Test Temperature	Not reported; Not reported
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; Not Reported; Not reported
Results Details Method, Results per Degradation Parameter, and	Not reported; Theoretical biochemical oxygen demand; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	4%; Not reported; Not reported; Not reported
Results Remarks and Results Details	Not reported; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 4: Test Substance Stability	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 3: Test Conditions			

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Study Citation:		NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		6629833		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary sources.
	Metric 6:	Testing Conditions	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 7:	Testing Consistency	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 8:	System Type and Design	Medium	Details regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	Details regarding the test organism were not provided in the secondary source but may be available in the primary source.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Details regarding this metric were limited; however, additional information may be included in the primary source.
	Metric 12:	Test Substance Purity	Medium	Details regarding the sampling methods were not reported in the secondary source but may be available in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Not reported in this secondary source; the primary source likely contains more detail.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The outcome of interest was reported clearly.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Not reported in this secondary source; the primary source likely contains more detail.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Due to limited information in the secondary source, the plausibility of the study results cannot be determined.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.

Overall Quality Determination**Medium**

* Related References: NITE; Chemical Risk Information Platform (CHRIP). Biodegradation and Bioconcentration. Tokyo, Japan: Natl Inst Tech Eval. Available from, as of Oct 16, 2014

Study Citation:	Vila-Costa, M., Sebastián, M., Pizarro, M., Cerro-Gálvez, E., Lundin, D., Gasol, J. M., Dachs, J. (2019). Microbial consumption of organophosphate esters in seawater under phosphorus limited conditions. Scientific Reports 9(1):233.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	5469216

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Biodegradation in seawater
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Blank and Control	Controls were run without addition of inorganic phosphorus, carbon and/or added organophosphorus esters; Controls with and without enrichment. Alkaline phosphatase activity (APA) was assessed as an indicator of P-limitation in water. Bacterial activity analyzed at the end of incubation.
Oxygen and Inoculum	not reported but likely aerobic; natural water: marine: Water from the Blanes Bay Microbial Observatory (BBMO, Mediterranean Sea 41°40'N, 2°48'E) sampled on July 7th, 2014
Duration, Parameter, System, and Sampling Frequency	48 hours; test mat.: Closed bottle incubation; 30 min and 24 hours
pH Adjusted and pH	Not Reported; Marine pH, not quantified
Concentration	Not reported
Composition and Test Temperature	Not reported; in situ temperature
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not reported; yes; Not reported
Results Details Method, Results per Degradation Parameter, and	HRGC-MS; Test substance concentration; Not Reported
Direct Quantum Yield Results	
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	half-life=41.8 hours; Standard error=0.0059; 24 hours; Not reported
Results Remarks and Results Details	Water used in this study had phosphate esters detected in them. Results were determined to be significantly different than zero.; reaction rate coefficient=-0.0166, adjusted r-squared=0.49, p value=0.03
Results Mean Total Recovery and Results per Recovery	Extraction reported but not quantified; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Low	The source of the test substance may be in the supplemental information or inferred from the study details. Details regarding the test substance purity were not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	The study did not include or report blank control groups but did include controls without additional phosphate esters.

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Study Citation:	Vila-Costa, M., Sebastián, M., Pizarro, M., Cerro-Gálvez, E., Lundin, D., Gasol, J. M., Dachs, J. (2019). Microbial consumption of organophosphate esters in seawater under phosphorus limited conditions. Scientific Reports 9(1):233.			
OECD Harmonized Template:	Biodegradation in Water			
HERO ID:	5469216			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	The test substance preparation and storage conditions details were not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some test condition details, such as pH, were not reported.
	Metric 7:	Testing Consistency	Medium	Limited details regarding testing consistency were reported; however, the omissions were not likely to have had a substantial impact on the interpretation of the study results.
	Metric 8:	System Type and Design	Medium	Limited details regarding test system design were reported; however, the omissions were not likely to have had a substantial impact on the interpretation of the study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The test inoculum sources were reported, but are not routinely used; however, the deviation was not likely to have a substantial impact on study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Low	Details regarding sampling methods of the outcome(s) were not fully reported, and the omissions may have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Several experimental results were not reported and the mass balance not fully reported; these omissions may have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods and kinetics calculations were reported.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Results were reasonable but no reference substances were used.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

Study Citation:	Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	8682618

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	No; other, potential for aerobic and anaerobic removal in sewage treatment plants; experimental; other: sludge suspensions in shaker flasks
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Balinway Chemical Reagent Co., Ltd. (China); Not reported; Not reported
Blank and Control	abiotic treatment consisted of medium heated to 100 deg C and after cooling, 1 g/L mercury sulfate added; Not reported
Oxygen and Inoculum	aerobic; activated sludge, non-adapted: From aerobic ponds of the Nanjing Chengdong sewage treatment plant where the volume of sewage was 350,000 m ³ , garbage diluted to 82.75 g/L with tap water. The garbage was kitchen garbage and agricultural residues from school canteens (with rice, meat, and small quantities of vegetables). ca. 35 days (based on figure 5); test mat.: shake flask; dissolved oxygen 3 mg/L; Ca. 5 days
Duration, Parameter, System, and Sampling Frequency	ca. 35 days (based on figure 5); test mat.: shake flask; dissolved oxygen 3 mg/L; Ca. 5 days
pH Adjusted and pH	yes (adjusted with NaOH); 7
Concentration	0.05 - mg/L
Composition and Test Temperature	deionized water, anhydrous potassium dihydrogen phosphate (KH ₂ PO ₄), disodium hydrogen phosphate dodecahydrate (Na ₂ HPO ₄ ·12H ₂ O), ammonium chloride (NH ₄ Cl), calcium chloride dihydrate (CaCl ₂ ·2H ₂ O), and magnesium chloride hexahydrate; 30 degrees C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; aerated; Not reported; 1 or 10 g/L sludge
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	GC-MS/MS; Electron collision ionization and selected reaction monitoring. Method detection limits: 0.01–1.5 mg/L, and quantitative limits: 0.01–4.6 mg/L (range reported for all OPEs included in the study).; Loss of test material (residue remaining); Not reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	ca. >95%; Not reported; 35 days; Not reported
Results Remarks and Results Details	Ca. >20% in 35 days at 1 g/L sludge and ca. >95% in 35 days at 10 g/L sludge; Not reported
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source of the test substance was reported and verified by analytical means (GC-MS/MS).
Domain 2: Test Design				
	Metric 3:	Study Controls	High	An abiotic control was included with valid results.

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Study Citation:		Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.		
OECD Harmonized Template:		Biodegradation in Water		
HERO ID:		8682618		
Domain	Metric	EVALUATION Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions (e.g., temperature was not reported); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The test organism, species, or inoculum sources were reported, but are not routinely used for similar study types.
	Metric 10:	Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	The kinetic calculations were not clearly described and these differences were not likely to have a substantial impact on study results.
Domain 8: Other				

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Study Citation:	Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	8682618

Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 17:	Verification or Plausibility of Results	Low	The study results were reasonable; however, the percent degradation results are approximated from figures.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

Medium

Study Citation:	Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	8682618

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	No; other, potential for aerobic and anaerobic removal in sewage treatment plants; experimental; other: sludge suspensions in shaker flasks
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Balinway Chemical Reagent Co., Ltd. (China); Not reported; Not reported
Blank and Control	abiotic treatment consisted of medium heated to 100 deg C and after cooling, 1 g/L mercury sulfate added; Not reported
Oxygen and Inoculum	anaerobic; activated sludge, non-adapted: From anaerobic ponds of the Nanjing Chengdong sewage treatment plant where the volume of sewage was 350,000 m ³ , garbage diluted to 82.75 g/L with tap water. The garbage was kitchen garbage and agricultural residues from school canteens (with rice, meat, and small quantities of vegetables).
Duration, Parameter, System, and Sampling Frequency	ca. 100 days; test mat.: shake flask; Ca. 10 samples over 100 days (based on figure 3)
pH Adjusted and pH	yes (adjusted with NaOH); 7
Concentration	0.5 - mg/L
Composition and Test Temperature	deionized water, anhydrous potassium dihydrogen phosphate (KH ₂ PO ₄), disodium hydrogen phosphate dodecahydrate (Na ₂ HPO ₄ ·12H ₂ O), ammonium chloride (NH ₄ Cl), calcium chloride dihydrate (CaCl ₂ ·2H ₂ O), and magnesium chloride hexahydrate; 35 degrees C
CEC, Water Aeration Dilution, Continuous Darkness, and Other Design	Not reported; Not applicable; nitrogen was blown through for 5 min to remove all oxygen; Not reported; 3 g/L sludge, ferrous chloride, 9 water sodium sulfide (Na ₂ S·9H ₂ O) and resazurin added to media bottles
Results Details Method, Results per Degradation Parameter, and Direct Quantum Yield Results	GC-MS/MS; Electron collision ionization and selected reaction monitoring. Method detection limits: 0.01–1.5 mg/L, and quantitative limits: 0.01–4.6 mg/L (range reported for all OPEs included in the study).; Loss of test material (residue remaining); Not reported
Results Value, Results Standard Deviation, Results Sample Time, and Results Reference Substance Compartments	50 (DT50); Not reported; 38.2 days; Not reported
Results Remarks and Results Details	DT50 = 38.2 days, k = 0.02/day, R ² = 0.89 (without additional treatments); 0.02/day (R ² = 0.89)
Results Mean Total Recovery and Results per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The source of the test substance was reported and verified by analytical means (GC-MS/MS).
Domain 2: Test Design			
	Metric 3: Study Controls	High	An abiotic control was included with valid results.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.			
OECD Harmonized Template: Biodegradation in Water			
HERO ID: 8682618			
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	There were reported deviations or omissions in testing conditions (e.g., temperature was not reported); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8: System Type and Design	Medium	Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms			
	Metric 9: Outcome Assessment Methodology	Medium	The test organism, species, or inoculum sources were reported, but are not routinely used for similar study types.
	Metric 10: Sampling Methods	N/A	This metric does not apply to this study type.
Domain 5: Outcome Assessment			
	Metric 11: Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12: Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest.
Domain 6: Confounding/Variable Control			
	Metric 13: Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15: Data Reporting	Medium	The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16: Statistical Methods and Kinetic Calculations	Medium	The kinetic calculations were not clearly described and these differences were not likely to have a substantial impact on study results.
Domain 8: Other			
	Metric 17: Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18: QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.
OECD Harmonized Template:	Biodegradation in Water
HERO ID:	8682618

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	No; other; Experimental; other: bench-scale composting bioreactor study
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Oxygen and Inoculum	anaerobic digestion; sewage, predominantly domestic (adaptation not specified): Dewatered sewage sludge from a wastewater treatment plant in Zhengzhou, China; domestic sewage/industrial sewage ratio of 7/3
Duration, Parameter, System, and Sampling Frequency	Not clearly stated, >10 days; test material; bench-scale composting bioreactor with accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE) prior to UPLC-MS/MS; twice
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0.25 day and 10.75 days; sludge; Dewatered sewage sludge and sawdust; water generated from the digestion process; Not reported; Not reported
Control Dark, Control, and Blank Concentration	Not reported; however, study performed in stainless steel bucket; Not reported; Not reported ca. 18.2± 0.43 - ng/g, d.w.
Analytical Method, Analytical Details, and Results Per Degredation Parameter	UPLC-MS/MS analysis; accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE); test material
Results Remarks	Final concentration = 31.9 ± 0.51 ng/g, d.w.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; Not reported; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	Removal rate = -74.8%; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The source or purity of the test substance was not reported; however, the test substance identity and purity were likely evaluated by analytical means (UPLC-MS/MS).
Domain 2: Test Design	Metric 3:	Study Controls	Low	No concurrent control group details were included; however, the lack of data was not likely to have a substantial impact on study results.

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Study Citation:		Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.		
OECD Harmonized Template:		Biodegradation in Sediment		
HERO ID:		10228662		
Domain	Metric	EVALUATION Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor omissions.
	Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions (e.g., pH); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	No inconsistencies were reported between tests.
	Metric 8:	System Type and Design	Medium	There were omissions in system type and design details; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Low	Details regarding sampling methods of the outcome(s) were not fully reported, and the omissions were likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty in the data was reported and the variability is not likely to impact the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	There were omissions in data reporting; however, the omissions were not likely to have had a substantial impact on interpretation of the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	There were omissions in the calculation details; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.

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Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

		EVALUATION		
Domain	Metric	Rating		Comments
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

Medium

Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	No; other; Experimental; other: bench-scale composting bioreactor study
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Oxygen and Inoculum	aerobic digestion; sewage, predominantly domestic (adaptation not specified): Dewatered sewage sludge from a wastewater treatment plant in Zhengzhou, China; domestic sewage/industrial sewage ratio of 7/3
Duration, Parameter, System, and Sampling Frequency	Not clearly stated, >10 days; test material; bench-scale composting bioreactor with accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE) prior to UPLC-MS/MS; twice
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0.25 day and 14.25 days; sludge; Dewatered sewage sludge and sawdust; water generated from the digestion process; Not reported; Not reported
Control Dark, Control, and Blank	Not reported; however, study performed in unplasticized polyvinyl chloride (UPVC) with outside diameter of 620mm and inside diameter of 600 mm. The height of the bioreactor was 1400 mm; Not reported; Not reported
Concentration	ca. 20.7 ± 0.13 - ng/g d.w.
Analytical Method, Analytical Details, and Results Per Degredation Parameter	UPLC-MS/MS analysis; accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE); test material
Results Remarks	Final concentration = 29.1 ± 0.53 ng/g, d.w.
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; Not reported; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	Removal rate = -40.7%; Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	Medium	The source or purity of the test substance was not reported; however, the test substance identity and purity were likely evaluated by analytical means (UPLC-MS/MS).
Domain 2: Test Design	Metric 3: Study Controls	Low	No concurrent control group details were included; however, the lack of data was not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.			
OECD Harmonized Template: Biodegradation in Sediment			
HERO ID: 10228662			
Domain 3: Test Conditions			
Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor omissions.
Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions (e.g., pH); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Metric 7:	Testing Consistency	High	No inconsistencies were reported between tests.
Metric 8:	System Type and Design	Medium	There were omissions in system type and design details; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms			
Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
Metric 12:	Test Substance Purity	Low	Details regarding sampling methods of the outcome(s) were not fully reported, and the omissions were likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control			
Metric 13:	Confounding Variables	High	Uncertainty in the data was reported and the variability is not likely to impact the study results.
Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
Metric 15:	Data Reporting	Medium	There were omissions in data reporting; however, the omissions were not likely to have had a substantial impact on interpretation of the study results.
Metric 16:	Statistical Methods and Kinetic Calculations	Medium	There were omissions in the calculation details; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
Domain 8: Other			
Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.

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Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

		EVALUATION		
Domain	Metric	Rating		Comments
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

Medium

Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	No; other; Experimental; other: bench-scale composting bioreactor study
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Oxygen and Inoculum	anaerobic digestion; sewage, predominantly domestic (adaptation not specified): Dewatered sewage sludge from a wastewater treatment plant in Zhengzhou, China; domestic sewage/industrial sewage ratio of 7/3
Duration, Parameter, System, and Sampling Frequency	Not clearly stated, >10 days; test material; bench-scale composting bioreactor with accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE) prior to UPLC-MS/MS; twice
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0.25 day and 10.75 days; sludge; Dewatered sewage sludge, <2 mm sawdust, pig manure; water generated from the digestion process; Not reported; Not reported
Control Dark, Control, and Blank Concentration	Not reported; however, study performed in stainless steel bucket; Not reported; Not reported ca. 34.0± 0.57 - ng/g, d.w.
Analytical Method, Analytical Details, and Results Per Degradation Parameter	UPLC-MS/MS analysis; accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE); test material
Results Remarks	Final concentration = 34.1 ± 0.90 ng/g, d.w.
Half-life, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; Not reported; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	Removal rate = -0.41%; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	The source or purity of the test substance was not reported; however, the test substance identity and purity were likely evaluated by analytical means (UPLC-MS/MS).
Domain 2: Test Design				
	Metric 3:	Study Controls	Low	No concurrent control group details were included; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.			
OECD Harmonized Template: Biodegradation in Sediment			
HERO ID: 10228662			
Domain 3: Test Conditions			
Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor omissions.
Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions (e.g., pH); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Metric 7:	Testing Consistency	High	No inconsistencies were reported between tests.
Metric 8:	System Type and Design	Medium	There were omissions in system type and design details; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms			
Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
Metric 12:	Test Substance Purity	Low	Details regarding sampling methods of the outcome(s) were not fully reported, and the omissions were likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control			
Metric 13:	Confounding Variables	High	Uncertainty in the data was reported and the variability is not likely to impact the study results.
Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
Metric 15:	Data Reporting	Medium	There were omissions in data reporting; however, the omissions were not likely to have had a substantial impact on interpretation of the study results.
Metric 16:	Statistical Methods and Kinetic Calculations	Medium	There were omissions in the calculation details; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
Domain 8: Other			
Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	No; other; Experimental; other: bench-scale composting bioreactor study
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported
Oxygen and Inoculum	aerobic digestion; sewage, predominantly domestic (adaptation not specified): Dewatered sewage sludge from a wastewater treatment plant in Zhengzhou, China; domestic sewage/industrial sewage ratio of 7/3
Duration, Parameter, System, and Sampling Frequency	Not clearly stated, >10 days; test material; bench-scale composting bioreactor with accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE) prior to UPLC-MS/MS; twice
Results Sample Time, Compartment, Sludge Compartment, Water Compartment, CEC, and pH	0.25 day and 14.25 days; sludge; Dewatered sewage sludge, pig manure and sawdust; water generated from the digestion process; Not reported; Not reported
Control Dark, Control, and Blank	Not reported; however, study performed in unplasticized polyvinyl chloride (UPVC) with outside diameter of 620mm and inside diameter of 600 mm. The height of the bioreactor was 1400 mm; Not reported; Not reported
Concentration	ca. 34.7± 0.42 - ng/g d.w.
Analytical Method, Analytical Details, and Results Per Degredation Parameter	UPLC-MS/MS analysis; accelerated solvent extraction (ASE) coupled with solid phase extraction (SPE); test material
Results Remarks	Final concentration = 18.3 ± 0.92 ng/g, d.w.
Halflife, Standard Deviation Results, Reference Substance Results, and Reference Substance Compartment Results	Not reported; Not reported; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported
Results Value, Direct Quantum Yield Results, and Transformation Products	Removal rate = 47.3%; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1: Metric 2:	Test Substance Identity Test Substance Purity	High Medium	The test substance was identified definitively. The source or purity of the test substance was not reported; however, the test substance identity and purity were likely evaluated by analytical means (UPLC-MS/MS).
Domain 2: Test Design	Metric 3:	Study Controls	Low	No concurrent control group details were included; however, the lack of data was not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.			
OECD Harmonized Template: Biodegradation in Sediment			
HERO ID: 10228662			
Domain 3: Test Conditions			
Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Metric 5:	Test Method Suitability	Medium	The test method was suitable for the test substance with minor omissions.
Metric 6:	Testing Conditions	Medium	There were omissions in testing conditions (e.g., pH); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Metric 7:	Testing Consistency	High	No inconsistencies were reported between tests.
Metric 8:	System Type and Design	Medium	There were omissions in system type and design details; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
Domain 4: Test Organisms			
Metric 9:	Outcome Assessment Methodology	High	The test organism information or inoculum source were reported.
Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
Metric 12:	Test Substance Purity	Low	Details regarding sampling methods of the outcome(s) were not fully reported, and the omissions were likely to have a substantial impact on study results.
Domain 6: Confounding/Variable Control			
Metric 13:	Confounding Variables	High	Uncertainty in the data was reported and the variability is not likely to impact the study results.
Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
Metric 15:	Data Reporting	Medium	There were omissions in data reporting; however, the omissions were not likely to have had a substantial impact on interpretation of the study results.
Metric 16:	Statistical Methods and Kinetic Calculations	Medium	There were omissions in the calculation details; however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
Domain 8: Other			
Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.

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Study Citation:	Pang, L., Ge, L., Yang, P., He, H., Zhang, H. (2018). Degradation of organophosphate esters in sewage sludge: Effects of aerobic/anaerobic treatments and bacterial community compositions. <i>Bioresource Technology</i> 255:16-21.
OECD Harmonized Template:	Biodegradation in Sediment
HERO ID:	10228662

		EVALUATION		
Domain	Metric	Rating		Comments
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

Medium

Study Citation:	Brodsky, J., Brodesser, J., Bauer, C., Roembke, J. (1997). The environmental fate of six existing chemicals in laboratory tests. Chemosphere 34(3):515-538.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	2131375

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: BBA guidelines (German Federal Research Centre for Agriculture and Forestry)
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Oxygen, pH, and CEC	aerobic; 5.5-7.5 (soil); Not reported
Test Type, Test Temperature, and Test Details	laboratory; 20±2°C; aerobic degradation in glass bottles using German standard soils
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	loamy sand; 2.0-3.0% OC; Not reported
Soil Classification, Microbial Biomass, and Humidity	strong humous; microbial population day 0=50 mg BioC/100g soil, day 100=27 mg BioC/100g soil: moisture content 40±10% of the maximum water capacity
Duration, Parameter, System, and Sampling Frequency	maximum 100 days; test mat.; Aerated glass vessels; Day 0, 2, 4, 8, 16, 32, 64, 100; samples were stored at -20°C prior to analysis
Control and Blank	Not reported; Not reported
Concentration	7.18 mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	GC/MS; detection limit 0.05 mg/kg; radiolabeling was not employed; DT-50; DT-90
Results Remarks	Classified as very persistent; DT values outside the range of the test period can only be regarded as an order of magnitude; decreases in the concentration are not equivalent to mineralization as volatility and adsorption were not controlled or evaluated.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	166.9 days; >>100 days; Not reported; day 0, 2, 4, 8, 16, 32, 64, 100; Not reported; Not reported
Results Details	2nd order kinetics based on [Substance Conc]=1/(a+b*t); Concentration on day 0, 2, 4, 8, 16, 32, 64, 100=7.18, 6.28, 6.07, 5.25, 4.02, 4.20, 4.46, 3.76 mg/kg, respectively
Mean Total Recovery Results and Results Per Recovery	114±11%; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified clearly.
	Metric 2:	Low	The source and purity of the test substance were not reported or verified by analytical means.
Domain 2: Test Design	Metric 3:	Uninformative	The study did not include or report crucial control groups that consequently made the study unusable (no positive control; no abiotic control).

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: Brodsky, J., Brodesser, J., Bauer, C., Roembke, J. (1997). The environmental fate of six existing chemicals in laboratory tests. Chemosphere 34(3):515-538.				
OECD Harmonized Template: Biodegradation in Soil				
HERO ID: 2131375				
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were minor omissions in testing conditions; however, the omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Microbial population declined over the course of the test; toxicity controls were not included.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods were limited; however, the omissions were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of uncertainty in the measurements noted; decrease of chemical concentration could not be fully attributed to degradation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation: Brodsky, J., Brodesser, J., Bauer, C., Roembke, J. (1997). The environmental fate of six existing chemicals in laboratory tests. Chemosphere 34(3):515-538.
OECD Harmonized Template: Biodegradation in Soil
HERO ID: 2131375

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Uninformative	

Study Citation:	ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	3809216

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; Primary degradation; Experimental; other: Non-guideline
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Not reported; Not reported; Not reported Notes: Not reported
Oxygen, pH, and CEC	Not reported; Not reported; Not reported
Test Type, Test Temperature, and Test Details	laboratory; Not reported; Not reported
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	Not Reported; Not reported; Not reported
Soil Classification, Microbial Biomass, and Humidity	"Standard soil"; Not reported: Not reported
Duration, Parameter, System, and Sampling Frequency	100 days; Not reported; Laboratory test system; Not reported
Control and Blank	Not reported; Not reported
Concentration	5 - mg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Not reported; Not reported; DT50 and DT90
Results Remarks	Degradation kinetic curve was fit to a 2nd order square root function.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	DT50: 167 days; DT90: >>100 days.; Not reported; Not reported; Not reported; Not reported
Results Details	Not reported
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	Medium	The test substance purity was not reported; however, the omission is unlikely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3: Study Controls	Low	The use of controls was not reported which may have an impact on the study results.

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Study Citation:		ECB, (2009). European Union risk assessment report: Tris(2-chloroethyl) phosphate, TCEP. :213.		
OECD Harmonized Template:		Biodegradation in Soil		
HERO ID:		3809216		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance homogeneity, preparation, and storage conditions were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Low	Testing conditions were not reported and the omissions may have an impact on the study results.
	Metric 7:	Testing Consistency	Medium	The number of study groups was not reported.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Low	Details regarding the inoculum type were not reported and the omissions may have an impact on the study results.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology was not clearly reported; however, the omission is unlikely to have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Low	The sampling methods were not reported and the omission may have an impact on the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty were not reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The analytical method was not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Some details regarding the statistical methods and kinetic calculations were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	A reference substance was not reported; however, the results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Low**

* Related References: Römbke J, Bauer C, Brodessaer J, Brodsky J, Danneberg G, Heimann D, Renner I & Schallnaß HJ (1995). Basis for the assessment of the ecotoxicological potential of "existing chemicals" in the terrestrial environment - development of a testing strategy. Batelle Eur. Res. rept. 106 04 103 (UBA), UBA-Texte 53/95 (in German).

Study Citation:	Hurtado, C., Montano-Chavez, Y. N., Dominguez, C., Bayona, J. M. (2017). Degradation of Emerging Organic Contaminants in an Agricultural Soil: Decoupling Biotic and Abiotic Processes. Water, Air, and Soil Pollution 228(7):243-p. 243.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	3859184

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Not reported; biodegradation in soil
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich, St. Louis, MO; NR; >97% Notes: Applied as mixture of contaminants: BPA, carbamazepine, ethyl paraben, 5-methyl-1H-benzotriazole, primidone, and Surfynol 104
Oxygen, pH, and CEC	aerobic; 8.1; 3.8 meq/100 g
Test Type, Test Temperature, and Test Details	laboratory; 23±1°C; Run in triplicate. 5g soil spiked with test substance mixture mixed with MilliQ water
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	sand; 90% sand, 8% silt, 2% clay, total organic carbon content 5 g/kg; Not reported
Soil Classification, Microbial Biomass, and Humidity	NR, collected from Llobregat River Delta agricultural area; Not reported: 70% soil water capacity
Duration, Parameter, System, and Sampling Frequency	40 d; test mat.; Test tubes covered with aluminum foil to protect from light, and sealed with glass wool.; 0, 0.25, 0.5, 1.3, 3, 7.2, 17, and 40 d
Control and Blank	Not reported; Soil autoclaved 3x; soil without contaminants
Concentration	50 µg/kg
Analytical Method, Analytical Details, and Results Per Degredation Parameter	Bruker Scion SQ GC-MS; Soil extracted ex via sonication with acetone/hexane, extracts evaporated under N2, redissolved in deionized water, pH adjusted to 2-3, cleaned up on SPE cartridges, eluted with ethyl acetate, and concentrated under N2; Test substance disappearance
Results Remarks	Value corrected for disappearance in blank. Log Koc, log Kow, and water solubility correlated with degradation rates, but not strongly correlated (R ² < 0.2). Degradation in sterilized soil may be attributed to sorption and/or hydrolysis processes.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Referenc Substance Compartment Results	Half-life: 17.7 d; 1; 40 d; Sterilized control; Rate constant (2nd order): 0.020 /ug kg d (R ² =0.883)Half-life: >40 d11±1%/0.25 d; 13±2%/0.5 d; 14±5%/1.3 d, 17±2%/3 d; 28±1%/7.2 d; 38±2%/17 d; 46±1%/40 d; due to sorption or hydrolysis
Results Details	Rate constant (2nd order): 0.057 /ug kg d (R ² =0.883)15±2%/0.25 d; 17±1%/0.5 d; 21±1%/1.3 d, 27±7%/3 d; 36±9%/7.2 d; 52±2%/17 d; 78±1%/40 d
Mean Total Recovery Results and Results Per Recovery	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The test substance source and purity was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	An abiotic loss control was included and the results were reported in depth.

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Study Citation:	Hurtado, C., Montano-Chavez, Y. N., Dominguez, C., Bayona, J. M. (2017). Degradation of Emerging Organic Contaminants in an Agricultural Soil: Decoupling Biotic and Abiotic Processes. Water, Air, and Soil Pollution 228(7):243-p. 243.			
OECD Harmonized Template:	Biodegradation in Soil			
HERO ID:	3859184			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	Limited details on test substance preparation were provided, storage was not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate soil characteristics were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	High	The inoculum source was reported and is routinely used for similar study types.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate and used accepted approaches.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed by statistical techniques between replicates, uncertainty was addressed in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate, extraction efficiency and limits of detection were not reported. Evidence was provided to support loss form biodegradation.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5113326

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris (2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; screening test; experimental; other: ISO DIS 11734
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Oxygen, pH, and CEC	NR; NR; NR
Test Type, Test Temperature, and Test Details	laboratory; 35 +/-2 deg C; NR
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; NR; NR
Soil Classification, Microbial Biomass, and Humidity	NR; NR; NR
Duration, Parameter, System, and Sampling Frequency	58 days; NR; NR; NR
Control and Blank	NR; NR
Concentration	NR 80 - mg/L
Analytical Method, Analytical Details, and Results Per Degredation Parameter	NR; NR; DOC (Dissolved Organic Carbon)
Results Remarks	0%/58 days
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	NR; NR; NR; NR; NR
Results Details	NR
Mean Total Recovery Results and Results Per Recovery	NR; NR

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively
	Metric 2:	Test Substance Purity	Medium	The test substance source and purity were not reported in this secondary source.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Concurrent control group details were not reported.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions				

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.			
OECD Harmonized Template: Biodegradation in Soil			
HERO ID: 5113326			
	Metric 5:	Test Method Suitability	Low Test method was not identified, but likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 6:	Testing Conditions	Medium Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium System type and design is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A This metric is not applicable to this type of study.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	Medium The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium Sampling methodology is unknown is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	Medium Sources of variability and uncertainty were not reported, more details may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	Medium Limited data reported; however, more data may be available in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium Details were not available; however, more data may be available in the primary source.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	Medium The study results were reasonable.
	Metric 18:	QSAR Models	N/A A QSAR model was not reported.

Overall Quality Determination**Medium**

* Related References: Citing HERO ID 5235795

Study Citation:	U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	5113326

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris (2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; screening test; experimental; other: NR
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Oxygen, pH, and CEC	NR; NR; NR
Test Type, Test Temperature, and Test Details	laboratory; NR; NR
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; NR; NR
Soil Classification, Microbial Biomass, and Humidity	NR; NR; NR
Duration, Parameter, System, and Sampling Frequency	100 days; NR; NR; NR
Control and Blank	NR; NR
Concentration	NR
Analytical Method, Analytical Details, and Results Per Degredation Parameter	NR; NR; NR
Results Remarks	DT50 of 167 days; DT90 >>100 days based on results from a laboratory test using 5 mg/kg soil for 100 days.
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	NR; NR; NR; NR; NR
Results Details	The kinetic curve was fitted to a 2nd order square root function.
Mean Total Recovery Results and Results Per Recovery	NR; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively
	Metric 2: Test Substance Purity	Medium	The test substance source and purity were not reported in this secondary source.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Concurrent control group details were not reported.
	Metric 4: Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Low	Test method was not identified, but likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.

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Study Citation:		U.S. EPA, (2015). Flame retardants used in flexible polyurethane foam: An alternatives assessment update.		
OECD Harmonized Template:		Biodegradation in Soil		
HERO ID:		5113326		
Domain	Metric	EVALUATION Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	Medium	System type and design is unknown but are likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown is unknown but is likely to be appropriate based on the data's inclusion in a peer- reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Sources of variability and uncertainty were not reported, more details may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited data reported; however, more data may be available in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Details were not available; however, more data may be available in the primary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.
Overall Quality Determination			Medium	

* Related References: Citing HERO ID 5235795

Study Citation:	Zhu, M., He, L., Liu, J., Long, Y., Shentu, J., Lu, L., Shen, D. (2023). Dynamic processes in conjunction with microbial response to unveil the attenuation mechanisms of tris (2-chloroethyl) phosphate (TCEP) in non-sanitary landfill soils. Environmental Pollution 316(Pt 1):120666.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	11364894

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	none; other; Experimental; other: anaerobic biodegradation in soil microcosms
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Macklin Biochemical Co.,Ltd. (Shanghai, China); NR; 98% Notes: NR
Oxygen, pH, and CEC	anaerobic; soil pH 7.5; pH over the test duration ranged from 7.5 down to ca. 7.15 (from Fig.2(A)); NR
Test Type, Test Temperature, and Test Details	laboratory; 25 deg C; after addition of test materials vials were vortexed with nitrogen (N2) for 20 min to remove oxygen (O2), vials were capped Teflon-coated butyl rubber-stopper and crimp seals and incubated in the dark without shaking
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; NR; DOC over the test duration ranged from ca. 0.25 to 0.50 mg/g (from Fig. 2.(C); range of FE2+, SO4(-2), CO2, and CH4 also presented in bar graphs in Fig 2.); NR
Soil Classification, Microbial Biomass, and Humidity	non-sanitary landfill (domestic) humus soil; TCEP was not detected in original landfill soils prior to incubation.; indigenous soil microbial communities: NR
Duration, Parameter, System, and Sampling Frequency	120 days; test mat.; Capped 30 mL glass vials; Samples collected in triplicate on days 2, 7, 14, 30, 60, 90, and 120
Control and Blank	NR; Abiotic sterilized (gamma-irradiation) controls at 5 and 10 ug/g TCEP were included
Concentration	= 5 - = 10 µg/g
Analytical Method, Analytical Details, and Results Per Degredation Parameter	test substance analyzed via GC-MS using an internal standard HMB ; potential transformation products determined via LC-MS/MS; supernatant from ultrasonic extraction of freeze-dried soil samples was collected and dried and then redissolved in hexane and purified for analysis; statistical analyses were performed using IBM SPSS Statistics. Treatment effects were tested by one-way analysis of variance (ANOVA). Statistical significance was determined at the 5% level.; removal rate
Results Remarks	Abiotic humus soil results (sterilized treatment): 43.9% reduction of TCEP (5 to 2.8 ug/g TCEP in 120 days at low test substance concentration) and 29.5% reduction of TCEP (10 ug/g to ca. 7.7 ug/g TCEP at high test substance concentration) based on Fig 1 A SFL and SFH data, respectively. Biotic humus soil results: 65.5% reduction of TCEP (5 to 1.7 ug/g TCEP in 120 days at low test substance concentration) and 4.3 ug/g reduction concentration of TCEP (from 10 ug/g) at high test substance concentration amended with acetate based on Fig 1 C FL and FHA data, respectively. (There is either a calculation error or a typo; the subsoil and humus soil % and ug/g results are swapped in the document text.)
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results Details	65.5% based on TCEP concentration decrease from 5 ug/g to 1.7 ug/g; Not specified; 120 days; NR; NR
Mean Total Recovery Results and Results Per Recovery	NR; Concentrations of TCEP decreased gradually in both sterilized and active soils (based on data presented in fig 1)
	NR; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	High	The test substance was identified definitively.
	Metric 2:	High	The source and purity of the test substance were reported.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Zhu, M., He, L., Liu, J., Long, Y., Shentu, J., Lu, L., Shen, D. (2023). Dynamic processes in conjunction with microbial response to unveil the attenuation mechanisms of tris (2-chloroethyl) phosphate (TCEP) in non-sanitary landfill soils. Environmental Pollution 316(Pt 1):120666.			
OECD Harmonized Template: Biodegradation in Soil			
HERO ID: 11364894			
Domain 2: Test Design	Metric 3: Study Controls	High	Control groups were included and accounted for in data evaluations.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	There were omissions in testing conditions (e.g., detailed soil characteristics); however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7: Testing Consistency	Medium	There were minor inconsistencies in test conditions across study groups.
	Metric 8: System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms	Metric 9: Outcome Assessment Methodology	High	The test organism information or inoculum source were reported and appropriate.
	Metric 10: Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment	Metric 11: Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment (i.e. biodegradation rate not reported for biotic processes alone; however datasets were presented in graphs).
	Metric 12: Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control	Metric 13: Confounding Variables	High	Sources of variability and uncertainty in the measurements and statistical techniques were considered and accounted for in data evaluation.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis	Metric 15: Data Reporting	Medium	The target chemical extraction efficiency, percent recovery, or mass balance, and method detection limits were not reported.
	Metric 16: Statistical Methods and Kinetic Calculations	Medium	The statistical analysis and/or kinetic calculations were not described clearly; however, sufficient data were provided.

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Study Citation:	Zhu, M., He, L., Liu, J., Long, Y., Shentu, J., Lu, L., Shen, D. (2023). Dynamic processes in conjunction with microbial response to unveil the attenuation mechanisms of tris (2-chloroethyl) phosphate (TCEP) in non-sanitary landfill soils. Environmental Pollution 316(Pt 1):120666.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	11364894

Domain	Metric	EVALUATION		Comments
		Rating		
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

High

Study Citation:	Zhu, M., He, L., Liu, J., Long, Y., Shentu, J., Lu, L., Shen, D. (2023). Dynamic processes in conjunction with microbial response to unveil the attenuation mechanisms of tris (2-chloroethyl) phosphate (TCEP) in non-sanitary landfill soils. Environmental Pollution 316(Pt 1):120666.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	11364894

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	none; other; Experimental; other: anaerobic biodegradation in soil microcosms
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Macklin Biochemical Co.,Ltd. (Shanghai, China); NR; 98% Notes: NR
Oxygen, pH, and CEC	anaerobic; soil pH 7.5; pH over the test duration ranged from ca. 7.5 down to ca. 7.1 (from Fig.2(B)); subsoil pH decreased within 2 weeks of incubation and then increased gradually to ca. 7.4 by day 120; NR
Test Type, Test Temperature, and Test Details	laboratory; 25 deg C; after addition of test materials vials were vortexed with N2 for 20 min to remove O2, vials were capped Teflon-coated butyl rubber-stopper and crimp seals and incubated in the dark without shaking
Soil Type, Clay Silts and Organic Carbon, and Bulk Density	other; NR; DOC over the test duration ranged from ca. 0.10 to 0.25 mg/g (from Fig. 2.(D)); range of FE2+, SO4(-2), CO2, and CH4 also presented in bar graphs in Fig 2.); NR
Soil Classification, Microbial Biomass, and Humidity	non-sanitary landfill (domestic) subsoil; TCEP was not detected in original landfill soils prior to incubation.; indigenous soil microbial communities: NR
Duration, Parameter, System, and Sampling Frequency	120 days; test mat.; Capped 30 mL glass vials; Samples collected in triplicate on days 2, 7, 14, 30, 60, 90, and 120
Control and Blank	NR; Abiotic sterilized (gamma-irradiation) controls at 5 and 10 ug/g TCEP were included
Concentration	= 5 - = 10 µg/g
Analytical Method, Analytical Details, and Results Per Degredation Parameter	test substance analyzed via GC-MS using an internal standard HMB ; potential transformation products determined via LC-MS/MS; supernatant from ultrasonic extraction of freeze-dried soil samples was collected and dried and then redissolved in hexane and purified for analysis; Statistical analyses were performed using IBM SPSS Statistics; Treatment effects were tested by one-way analysis of variance (ANOVA). Statistical significance was determined at the 5% level.; removal rate
Results Remarks	Abiotic subsoil soil results (sterilized treatment): 36.8% reduction of TCEP (5 to 3.2 ug/g TCEP in 120 days at low test substance concentration) and 26.1% reduction of TCEP (10 ug/g to ca. 7.4 ug/g TCEP at high test substance concentration) based on Fig 1 B SBL and SBH data, respectively. Biotic humus soil results: 73.9% reduction of TCEP (5 to 1.3 ug/g TCEP in 120 days at low test substance concentration) and 2.5 ug/g reduction concentration of TCEP (from 10 ug/g) at high test substance concentration amended with acetate based on Fig 1 C BL and BHA data, respectively. (There is either a calculation error or a typo; the subsoil and humus soil % and ug/g results are swapped in the document text.) 73.9% removal from both abiotic and biotic processes (concentrations decreased from 5 ug/g to 1.3 ug/g); Not specified; 120 days; NR; NR
Results Value, Standard Deviation Results, Sample Time Results, Reference Substance Results, and Reference Substance Compartment Results	NR; Concentrations of TCEP decreased gradually in both sterilized and active soils (based on data presented in fig 1)
Results Details	
Mean Total Recovery Results and Results Per Recovery	NR; NR

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High The source and purity of the test substance were reported.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Zhu, M., He, L., Liu, J., Long, Y., Shentu, J., Lu, L., Shen, D. (2023). Dynamic processes in conjunction with microbial response to unveil the attenuation mechanisms of tris (2-chloroethyl) phosphate (TCEP) in non-sanitary landfill soils. Environmental Pollution 316(Pt 1):120666.			
OECD Harmonized Template: Biodegradation in Soil			
HERO ID: 11364894			
Domain 2: Test Design	Metric 3: Study Controls	High	Control groups were included and accounted for in data evaluations.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	There were omissions in testing conditions (e.g., detailed soil characteristics); however, sufficient data were reported to determine that the omissions were not likely to have a substantial impact on study results.
	Metric 7: Testing Consistency	Medium	There were minor inconsistencies in test conditions across study groups.
	Metric 8: System Type and Design	High	The system type and design were appropriate.
Domain 4: Test Organisms	Metric 9: Outcome Assessment Methodology	High	The test organism information or inoculum source were reported and appropriate.
	Metric 10: Sampling Methods	N/A	The metric is not applicable to the study.
Domain 5: Outcome Assessment	Metric 11: Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome assessment (i.e. biodegradation rate not reported for biotic processes alone; however datasets were presented in graphs).
	Metric 12: Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control	Metric 13: Confounding Variables	High	Sources of variability and uncertainty in the measurements and statistical techniques were considered and accounted for in data evaluation.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis	Metric 15: Data Reporting	Medium	The target chemical extraction efficiency, percent recovery, or mass balance, and method detection limits were not reported.
	Metric 16: Statistical Methods and Kinetic Calculations	Medium	The statistical analysis and/or kinetic calculations were not described clearly; however, sufficient data were provided.
Domain 8: Other			

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Study Citation:	Zhu, M., He, L., Liu, J., Long, Y., Shentu, J., Lu, L., Shen, D. (2023). Dynamic processes in conjunction with microbial response to unveil the attenuation mechanisms of tris (2-chloroethyl) phosphate (TCEP) in non-sanitary landfill soils. Environmental Pollution 316(Pt 1):120666.
OECD Harmonized Template:	Biodegradation in Soil
HERO ID:	11364894

Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

Overall Quality Determination

High

Study Citation:	Arukwe, A., Carteny, C. C., Eggen, T., Möder, M. (2018). Novel aspects of uptake patterns, metabolite formation and toxicological responses in Salmon exposed to the organophosphate esters-Tris(2-butoxyethyl)- and tris(2-chloroethyl) phosphate. <i>Aquatic Toxicology</i> 196:146-153.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5469342

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Calculation; other: Not indicated
Solvent, Reactivity, Storage, Stability	NR; NR; Stored in Milli-Q water at 18-20 C; NR
Radiolabel, Source, State, Purity	NR; Sigma Aldrich Chemie GmbH (Steinheim, Germany); NR; 97% Notes: NR
Test Organism and Test Organism Details	Atlantic salmon (<i>Salmo salar</i>); Juveniles (parr; average length: 9.9±0.1 cm; average weight: 7.76±0.2 g)
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 8 C; 6.5; Not reported
Media Type, TOC, and Salinity	other; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Continuously aerated tap water with target chemical concentrations replenished every 3 days.; Not reported; Measured values were 22-46% lower than the nominal values, most likely due to glassware adsorption. BCF values were adjusted for adsorption.
Test Type, Test Temperature, and Test Condition	semi-static; 8 C; 12 hours light/dark
Comments	
Duration, Parameter, and Sampling Frequency	7 days; other; 1 sample (6 exposure groups, 1 control, 16 ea.)
Concentration	0.04 - mg/L
Analytical Method and Analytical Details	Liquid chromatography-tandem mass spectrometry (HPLC-MS-MS) at positive electrospray ionization and multiple reaction monitoring modes; Fish muscle was dried, crashed, and homogenized ultrasonically extract with methanol.;
Rate Constant and Results per Recovery	Not Reported; Not reported
Statistics, Basis, and Calculation Basis	Standard deviation (n=3); whole body fresh weight (fw); steady state
Results Value and Results Details	BCF fw (L/kg): 0.31±0.06; Concentration in fish (µg/kg fresh weight): 9.7±2.2; Concentration in fish (µg/kg dry weight): 41.5±11.4
Metabolites, Reference, and Results Reference Substance	Hydrolysis product (di-(2-chloroethyl)phosphate) at low abundance; One control group; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3:	Study Controls	High Appropriate controls were used to measure test substance adsorption to the vessel walls.
	Metric 4:	Test Substance Stability	High The test substance preparation, storage conditions, and stock concentrations were reported.
Domain 3: Test Conditions			

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Study Citation:	Arukwe, A., Carteny, C. C., Eggen, T., Möder, M. (2018). Novel aspects of uptake patterns, metabolite formation and toxicological responses in Salmon exposed to the organophosphate esters-Tris(2-butoxyethyl)- and tris(2-chloroethyl) phosphate. Aquatic Toxicology 196:146-153.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5469342			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	The testing conditions were consistent across the sample groups.
	Metric 8:	System Type and Design	High	The system type was appropriate. Equilibrium was established and maintained.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The test organism was appropriate for the study type and described.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was reported for the BCF values and concentrations in fish. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes were not reported; however, this omission is unlikely to have a substantial impact on the study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable as compared to other reported values.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**High**

Study Citation:	Arukwe, A., Carteny, C. C., Eggen, T., Möder, M. (2018). Novel aspects of uptake patterns, metabolite formation and toxicological responses in Salmon exposed to the organophosphate esters-Tris(2-butoxyethyl)- and tris(2-chloroethyl) phosphate. <i>Aquatic Toxicology</i> 196:146-153.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5469342

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Calculation; other: Not indicated
Solvent, Reactivity, Storage, Stability	NR; NR; Stored in Milli-Q water at 18-20 C; NR
Radiolabel, Source, State, Purity	NR; Sigma Aldrich Chemie GmbH (Steinheim, Germany); NR; 97% Notes: NR
Test Organism and Test Organism Details	Atlantic salmon (<i>Salmo salar</i>); juveniles (parr; average length:9.9±0.1 cm; average weight: 7.76±0.2 g)
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 8°C; 6.5; Not reported
Media Type, TOC, and Salinity	other; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Continuously aerated tap water with target chemical concentrations replenished every 3 days.; Not reported; Measured values were 22-46% lower than the nominal values, most likely due to glassware adsorption. BCF values were adjusted for adsorption.
Test Type, Test Temperature, and Test Condition	semi-static; 8°C; 12 hours light/dark
Comments	
Duration, Parameter, and Sampling Frequency	7 days; other; 1 sample (6 exposure groups, 1 control, 16 ea.)
Concentration	0.2 - mg/L
Analytical Method and Analytical Details	Liquid chromatography-tandem mass spectrometry (HPLC-MS-MS) at positive electrospray ionization and multiple reaction monitoring modes; Fish muscle was dried, crashed, and homogenized ultrasonically extract with methanol;
Rate Constant and Results per Recovery	Not Reported; Not reported
Statistics, Basis, and Calculation Basis	Standard deviation n=3; whole body fresh weight (fw); steady state
Results Value and Results Details	BCF fw (L/kg): 0.16±0.03; Concentration in fish (µg/kg fresh weight): 23.8±6.3; Concentration in fish (µg/kg dry weight): 101.6±28.5
Metabolites, Reference, and Results Reference Substance	Hydrolysis product (di-(2-chloroethyl)phosphate) at low abundance; One control group; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate controls were used to measure test substance adsorption to the vessel walls.
	Metric 4: Test Substance Stability	High	The test substance preparation, storage conditions, and stock concentrations were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	The testing conditions were reported and appropriate.

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Study Citation:	Arukwe, A., Carteny, C. C., Eggen, T., Möder, M. (2018). Novel aspects of uptake patterns, metabolite formation and toxicological responses in Salmon exposed to the organophosphate esters-Tris(2-butoxyethyl)- and tris(2-chloroethyl) phosphate. <i>Aquatic Toxicology</i> 196:146-153.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5469342			
	EVALUATION			
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	The testing conditions were consistent across the sample groups.
	Metric 8:	System Type and Design	High	The system type was appropriate. Equilibrium was established and maintained.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The test organism was appropriate for the study type and described.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was reported for the BCF values and concentrations in fish. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes were not reported; however, this omission is unlikely to have a substantial impact on the study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable as compared to other reported values.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Arukwe, A., Carteny, C. C., Eggen, T., Möder, M. (2018). Novel aspects of uptake patterns, metabolite formation and toxicological responses in Salmon exposed to the organophosphate esters-Tris(2-butoxyethyl)- and tris(2-chloroethyl) phosphate. <i>Aquatic Toxicology</i> 196:146-153.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5469342

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Calculation; other: Not indicated
Solvent, Reactivity, Storage, Stability	NR; NR; Stored in Milli-Q water at 18-20 C; NR
Radiolabel, Source, State, Purity	NR; Sigma Aldrich Chemie GmbH (Steinheim, Germany); NR; 97% Notes: NR
Test Organism and Test Organism Details	Atlantic salmon (<i>Salmo salar</i>); Juveniles (parr; average length:9.9±0.1 cm; average weight: 7.76±0.2 g)
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 8 C; 6.5; Not reported
Media Type, TOC, and Salinity	other; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Continuously aerated tap water with target chemical concentrations replenished every 3 days.; Not reported; Measured values were 22-46% lower than the nominal values, most likely due to glassware adsorption. BCF values were adjusted for adsorption.
Test Type, Test Temperature, and Test Condition	semi-static; 8 C; 12 hours light/dark
Comments	
Duration, Parameter, and Sampling Frequency	7 days; other; 1 sample (6 exposure groups, 1 control, 16 ea.)
Concentration	1.0 - mg/L
Analytical Method and Analytical Details	Liquid chromatography-tandem mass spectrometry (HPLC-MS-MS) at positive electrospray ionization and multiple reaction monitoring modes; Fish muscle was dried, crashed, and homogenized ultrasonically extract with methanol;
Rate Constant and Results per Recovery	Not Reported; Not reported
Statistics, Basis, and Calculation Basis	Standard deviation (n=3); whole body fresh weight (fw); steady state
Results Value and Results Details	BCF fw(L/kg): 0.34±0.04; Concentration in fish (µg/kg fresh weight): 263.6±34.1; Concentration in fish (µg/kg dry weight): 1052.9±236.3
Metabolites, Reference, and Results Reference Substance	Hydrolysis product (di-(2-chloroethyl)phosphate) at low abundance; One control group; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate controls were used to measure test substance adsorption to the vessel walls.
	Metric 4: Test Substance Stability	High	The test substance preparation, storage conditions, and stock concentrations were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	The testing conditions were reported and appropriate.

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Study Citation:	Arukwe, A., Carteny, C. C., Eggen, T., Möder, M. (2018). Novel aspects of uptake patterns, metabolite formation and toxicological responses in Salmon exposed to the organophosphate esters-Tris(2-butoxyethyl)- and tris(2-chloroethyl) phosphate. <i>Aquatic Toxicology</i> 196:146-153.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5469342			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	The testing conditions were consistent across the sample groups.
	Metric 8:	System Type and Design	High	The system type was appropriate. Equilibrium was established and maintained.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The test organism was appropriate for the study type and described.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty was reported for the BCF values and concentrations in fish. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Health outcomes were not reported; however, this omission is unlikely to have a substantial impact on the study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable as compared to other reported values.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Bekele, T. G., Zhao, H., Wang, Q. (2021). Tissue distribution and bioaccumulation of organophosphate esters in wild marine fish from Laizhou Bay, North China: Implications of human exposure via fish consumption. <i>Journal of Hazardous Materials</i> 401:123410.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6628255

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris (2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Monitoring study data
Solvent, Reactivity, Storage, Stability	NA; NA; NA; NA
Radiolabel, Source, State, Purity	NA; Environmental Samples; NA; NA Notes: Analytical standards from Accustandard Inc., >95% purity
Test Organism and Test Organism Details	dotted gizzard shad (<i>Konosirus punctatus</i>), halfbeak (<i>Hemirhamphus sajori</i>), mullet (<i>Liza haematocheilus</i>), silvery pomfret (<i>Pampus argenteus</i>), Chinese sea perch (<i>Lateolabrax maculatus</i>), eelgoby (<i>Odontamblyopus rubicundus</i>), fat greenling (<i>Hexagrammos otakii</i>), flathead (<i>Platycephalus indlcus</i>), javeline goby (<i>Acanthogobius hasta</i>), and tongue sole (<i>Cymoglossus robustus</i>); samples collected at one time using a bottom trawl, in September of 2017 and 2018 from Laizhou Bay, China
Lipid Content, Test Temperature, pH, and Depuration Time	Measured but not reported; NA; NA; NA
Media Type, TOC, and Salinity	natural water - marine; NR; NR
Dissolved Oxygen, Conductivity, and Hardness	NR; NR; NR
Exposure Route, Elimination, and Nominal Measurements	Water; NA; NA
Test Type, Test Temperature, and Test Condition	field study; NA; coastal area of Laizhou Bay, North China
Comments	
Duration, Parameter, and Sampling Frequency	NA; other; NA
Concentration	NR NR - NR NR NR
Analytical Method and Analytical Details	GC-MS; Not Reported;
Rate Constant and Results per Recovery	NR; Muscle samples 104% (%RSD 11) viscera samples 95% (16%RSD)
Statistics, Basis, and Calculation Basis	Not Reported; Muscle, Liver, Kidney, Gill; BAF = Cbiota/Cwater
Results Value and Results Details	log BAF (L/kg wet weight; range and mean): 2.1-3.6 (2.9 ± 0.5) in muscle, 2.6-3.8 (3.3 ± 0.4) in liver, 2.8-3.7 (3.3 ± 0.3) in kidney, 2.9-4.0 (3.3 ± 0.3) in gill; Data for specific chemicals located in supplemental file.
Metabolites, Reference, and Results Reference Substance	NA; Recoveries of surrogate standards ranged between 69 and 112%; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	N/A	Not applicable to this type of monitoring study/field study.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4: Test Substance Stability	N/A	Not applicable to this type of monitoring study/field study.

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Domain	Metric	EVALUATION		Comments
		Rating		
Study Citation: Bekele, T. G., Zhao, H., Wang, Q. (2021). Tissue distribution and bioaccumulation of organophosphate esters in wild marine fish from Laizhou Bay, North China: Implications of human exposure via fish consumption. Journal of Hazardous Materials 401:123410.				
OECD Harmonized Template: Aquatic Bioconcentration				
HERO ID: 6628255				
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	N/A	Not applicable to this type of monitoring study/field study.
	Metric 8:	System Type and Design	Medium	The system type and design were not capable of appropriately maintaining substance concentrations or not described but the deviation was not likely to have a substantial impact on study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	Medium	The test organisms information was reported, though some information (lipid content) was not specified.
	Metric 10:	Sampling Methods	N/A	Not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium	Minor limitations were identified in sampling methods of the outcome(s) of interest were reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	Not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The target chemical concentration in water and in the separate fish species were not reported; however, these omissions were not likely to have a substantial impact on study results
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset(s).
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported.

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Study Citation:	Bekele, T. G., Zhao, H., Wang, Q. (2021). Tissue distribution and bioaccumulation of organophosphate esters in wild marine fish from Laizhou Bay, North China: Implications of human exposure via fish consumption. Journal of Hazardous Materials 401:123410.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6628255

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Choo, G., Cho, H. S., Park, K., Lee, J. W., Kim, P., Oh, J. E. (2018). Tissue-specific distribution and bioaccumulation potential of organophosphate flame retardants in crucian carp. Environmental Pollution 239:161-168.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5469301

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Not indicated
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	TCEP-d12 (Cambridge Isotope laboratories, Andover, MA); AccuStandard (New Haven, CT, USA); NR; NR
Test Organism and Test Organism Details	Crucian carp (<i>Carassius auratus</i>) (7 males, 13 females); Average total length and body weight of the crucian carp were 24.9±2.37 cm and 312±102 g, respectively
Lipid Content, Test Temperature, pH, and Depuration Time	Lipid contents from a previous study of Crucian Carp were used (1.556% male and 1.584% female).; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Field exposure; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	field study; Not reported; Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	Field samples were collected over a 3 month period (Sept - Nov 2015) from Nakdong River, South Korea.; other; Detection Frequency: Muscle:100%, Liver:100%, Gonad: 100%, Whole Blood: 90%
Concentration	Not Reported
Analytical Method and Analytical Details	GC-MS/MS with DB-5MS UI; MDL 0.24 (water), 0.01 (sediment), 0.06-0.22 (biota); Tissue samples were homogenized and spiked with internal standard; centrifuged; and then extracted with DCM and hexane. Blood samples were extracted using SPE with DCM and methanol.;
Rate Constant and Results per Recovery	Not reported; Recoveries for OPFRs tested 52-108% in biota, 69-92% in water, and 91-106% in sediments.
Statistics, Basis, and Calculation Basis	Up Stream, Mid stream in ng/g ww: Muscle: 0.688-1.06, 0.530-1.03, Liver: 1.31-2.96, 1.44-2.70; Gonad: 0.744-1.91, 0.544-1.34; Whole Blood: N.D.-3.65, N.D.-13.7; Not Reported; steady state
Results Value and Results Details	Mean BSAF in muscle, liver, and gonad tissues, respectively (L/kg): 4.80, 11.0, 5.63; BSAF=($[TCEP \text{ biota}] / [\text{lipid fraction}]$)/($[TCEP \text{ sediment}] / [\text{organic carbon fraction}]$). Lipid-normalized concentrations in crucian carp were determined using representative values of lipid content (female: 1.556%; male: 1.584%). Using wet weight concentration of biota, BSAF (L/kg) in muscle, liver, and gonad tissues = 1.09, 2.49, and 1.27, respectively.
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks and internal standards; Procedural blanks were not detected or lower than the MDLs.

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was identified in field samples using appropriate analytical techniques.
Domain 2: Test Design			

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Study Citation:		Choo, G., Cho, H. S., Park, K., Lee, J. W., Kim, P., Oh, J. E. (2018). Tissue-specific distribution and bioaccumulation potential of organophosphate flame retardants in crucian carp. Environmental Pollution 239:161-168.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		5469301		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 3:	Study Controls	High	Appropriate blanks were used to determine background contamination.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	The metric is not applicable to the study type.
	Metric 6:	Testing Conditions	High	Field conditions where samples were collected were reported.
	Metric 7:	Testing Consistency	High	The test organisms were collected from the same locations and processed consistently.
	Metric 8:	System Type and Design	High	The test method is appropriate for the study type (field study).
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The test organisms were described and appropriate for the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Accuracy (% precision) in the bioaccumulation factors were reported in the supplemental information.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric does not apply since there was only one study group.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The data reporting was appropriate and the analytical method was suitable.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were clearly described and appropriate for the data.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Choo, G., Cho, H. S., Park, K., Lee, J. W., Kim, P., Oh, J. E. (2018). Tissue-specific distribution and bioaccumulation potential of organophosphate flame retardants in crucian carp. Environmental Pollution 239:161-168.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5469301

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: None indicated
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	TCEP-d12 (Cambridge Isotope laboratories, Andover, MA); AccuStandard (New Haven, CT, USA); NR; NR
Test Organism and Test Organism Details	Crucian carp (Carassius auratus); Average total length and body weight of the crucian carp were 24.9±2.37 cm and 312±102 g, respectively
Lipid Content, Test Temperature, pH, and Depuration Time	Lipid contents from a previous study of Crucian Carp were used (1.556% male and 1.584% female).; Not reported; Not reported; Not Reported
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Field exposure; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	field study; Not reported; Not Reported
Comments	
Duration, Parameter, and Sampling Frequency	Field samples were collected over a 3 month period.; other; Detection Frequency: Muscle: 100%, Liver: 100%, Gonad: 100%, Whole Blood: 90%
Concentration	Not Reported
Analytical Method and Analytical Details	Tissue samples were homogenized and spiked with internal standard; centrifuged; and then extracted with DCM and hexane. Blood samples were extracted using SPE with DCM and methanol.; GC-MS/MS with DB-5MS UI; MDL 0.24 (water), 0.01 (sediment), 0.06-0.22 (biota);
Rate Constant and Results per Recovery	Not reported; Recoveries for OPFRs tested 52-108% in biota, 69-92% in water, and 91-106% in sediments.
Statistics, Basis, and Calculation Basis	Up Stream, Mid stream in ng/g ww: Muscle: 0.688-1.06, 0.530-1.03, Liver: 1.31-2.96, 1.44-2.70; Gonad: 0.744-1.91, 0.544-1.34; Whole Blood: N.D.-3.65, N.D.-13.7; Not Reported; steady state
Results Value and Results Details	Mean BCF in muscle, liver, and gonad tissues, respectively (L/kg): 6.15x10 ³ , 1.41x10 ⁴ , 7.5x10 ³ ; BCF=(TCEP biota)/lipid fraction)/[TCEP water]; values calculated after excluding non-detects. Lipid-normalized concentrations in crucian carp were determined using representative values of lipid content (female: 1.556%; male: 1.584%). Using wet weight concentration of biota, BCF (L/kg) in muscle, liver, and gonad tissues = 30.7, 70.7, and 37.7, respectively.
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks and internal standards; Procedural blanks were not detected or lower than the MDLs.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was identified in field samples using appropriate analytical techniques.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate blanks were used to determine background contamination.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Choo, G., Cho, H. S., Park, K., Lee, J. W., Kim, P., Oh, J. E. (2018). Tissue-specific distribution and bioaccumulation potential of organophosphate flame retardants in crucian carp. Environmental Pollution 239:161-168.			
OECD Harmonized Template: Aquatic Bioconcentration			
HERO ID: 5469301			
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	N/A The metric is not applicable to the study type.
	Metric 6:	Testing Conditions	High Field conditions where samples were collected were reported.
	Metric 7:	Testing Consistency	High The test organisms were collected from the same locations and processed consistently.
	Metric 8:	System Type and Design	High The test method is appropriate for the study type (field study).
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High The test organisms were described and appropriate for the study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High Accuracy (% precision) in the bioaccumulation factors were reported in the supplemental information.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric does not apply since there was only one study group.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High The data reporting was appropriate and the analytical method was suitable.
	Metric 16:	Statistical Methods and Kinetic Calculations	High Statistical methods were clearly described and appropriate for the data.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High The study results are reasonable.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.
Overall Quality Determination		High	

Study Citation:	Guo, J., Venier, M., Salamova, A., Hites, R. A. (2017). Bioaccumulation of Dechloranes, organophosphate esters, and other flame retardants in Great Lakes fish. <i>Science of the Total Environment</i> 583(Elsevier):1-9.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	3985267

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported
Solvent, Reactivity, Storage, Stability	NA; NR; Organisms stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Organisms collected from the five Great Lakes, USA. Air samples collected from the five US' Integrated Atmospheric Deposition Network (IADN) sites. Water samples collected in all five of the Great Lakes; NA; NA
Test Organism and Test Organism Details	Lake trout, <i>Salvelinus namaycush</i> or walleye, <i>Sander vitreus</i> ; n=3 for each lake, walleye collected from Lake Erie only.
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not applicable
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured (average, n=12)
Test Type, Test Temperature, and Test Condition	field study; Not reported; Combined concentrations in fish and water samples collected from all five Great Lakes (Superior, Michigan, Huron, Erie, and Ontario) reported to determine distribution and potential bioaccumulation.
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; 2010 (organism)
Concentration	464 pg/L
Analytical Method and Analytical Details	Agilent 7890 GC with Agilent 5973 MS in electron impact mode; analytes separated by RTX-1614 fused silica capillary GC column; Detection limits 0.002 - 21 ng/g lipid (organism); Homogenized fish tissues Soxhlet extracted with n-hexane in acetone, cleaned up on Florisil column, eluted with acetone in DCM, concentrated, solvent exchanged to n-hexane, concentrated under N ₂ ;
Rate Constant and Results per Recovery	Not applicable; Surrogate: 71-29% (organism)
Statistics, Basis, and Calculation Basis	ANOVA comparison of concentration among lakes; Tissue wet wt., lipid normalized; steady state
Results Value and Results Details	BCF=28.7 L/g lipid calculated from geometric mean of Great Lakes fish and water; Concentrations in fish ng/g lipid: 12.8 (Michigan), 11.2 (Superior), 12.2 (Huron), 35.6 (Erie), 6.55 (Ontario), 13.3 (geometric mean); Concentrations in Lake Erie significantly higher based on lipid normalized concentrations, but not based on wet wt. only. Concentration in water: 464 pg/L (geometric mean)
Metabolites, Reference, and Results Reference Substance	Not reported; Procedural blanks (n=3, fish); < 10% of detected concentration in samples

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified by name.
	Metric 2:	Test Substance Purity	High The sample source was reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	High Procedural blanks were included and responded within an appropriate range.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation:	Guo, J., Venier, M., Salamova, A., Hites, R. A. (2017). Bioaccumulation of Dechloranes, organophosphate esters, and other flame retardants in Great Lakes fish. Science of the Total Environment 583(Elsevier):1-9.		
OECD Harmonized Template:	Aquatic Bioconcentration		
HERO ID:	3985267		
Domain 3: Test Conditions			
Metric 4:	Test Substance Stability	Medium	Water sample preparation was not reported, may be reported elsewhere. Organism sample preparation and storage was reported and appropriate.
Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
Metric 6:	Testing Conditions	Medium	No environmental sampling conditions or sample characteristics were reported.
Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms			
Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
Metric 10:	Sampling Methods	Medium	Organism species was reported, no other characteristics were included.
Domain 5: Outcome Assessment			
Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
Metric 12:	Test Substance Purity	Medium	Lake Michigan was only sampled once for organisms, sample frequency for water samples not reported.
Domain 6: Confounding/Variable Control			
Metric 13:	Confounding Variables	Medium	Calculated biota-air and biota-water accumulation factors included in supplemental media, which was not accessible here.
Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis			
Metric 15:	Data Reporting	High	The analytical method was appropriate, limits of detection and extraction efficiency were reported and appropriate, lipid normalized concentrations in organisms were reported. BCFs were calculated by the reviewer.
Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was described and applied appropriately.
Domain 8: Other			
Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method and comparable to previous studies; however, the study overall had limited details and did not separate bioaccumulation by species or lake.
Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Hou, R., Liu, C., Gao, X., Xu, Y., Zha, J., Wang, Z. (2017). Accumulation and distribution of organophosphate flame retardants (PFRs) and their di-alkyl phosphates (DAPs) metabolites in different freshwater fish from locations around Beijing, China. Environmental Pollution 229:548-556.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4165573

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not reported; tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Accumulation in different freshwater fish from locations around Beijing, China
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Accustandard, Inc. (New Haven, CT, USA); NR; 95-100% Notes: TCEP
Test Organism and Test Organism Details	top mouth gudgeon (<i>Pseudorasbora parva</i>), crucian carp (<i>Carassius auratus</i>) and loach (<i>Misgurnus anguillicaudatus</i>); Fish were collected from 9 locations in urban surface water in Beijing during
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; ambient; not reported; not reported
Media Type, TOC, and Salinity	natural water: freshwater; not reported; not reported
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported
Exposure Route, Elimination, and Nominal Measurements	natural environment; not reported; not reported
Test Type, Test Temperature, and Test Condition	field study; ambient; pilot field investigation of target chemicals in freshwater fish collected from bodies of water in Beijing, China
Comments	
Duration, Parameter, and Sampling Frequency	Samples collected in December 2015; other; not reported
Concentration	Not Reported
Analytical Method and Analytical Details	UPLC-MS/MS under positive electrospray ionization mode (ESI+); method blanks, limits of quantification and matrix effects for the determination of the target compounds are listed in the supplemental document.;
Rate Constant and Results per Recovery	not reported; recoveries listed in the supplemental document
Statistics, Basis, and Calculation Basis	not reported; Not Reported; BCF
Results Value and Results Details	34.7; Mean whole-body BCF ww = 34.7 as reported in paper Mean whole-body BCF ww = 28.97 based on the conc. in Crucian carp and Loach [ng/g ww] divided by average conc. in water [ng/mL] Tissue specific results: BCF muscle: 35 and 26 BCF liver: 47 and 66 BCF kidney: 44 and 27 BCF intestine: 50 and 36 Based on the conc. in tissue [ng/g ww] divided by the average conc. in water [ng/mL] for Crucian carp and Loach, respectively. BCF muscle: 195 and 143 BCF liver: 256 and 360 BCF kidney: 240 and 148 BCF intestine: 276 and 200 based on the conc. in tissue [ng/g lipid weight] divided by the average conc. in water [ng/mL] for Crucian carp and Loach, respectively. The tissue specific values are based on average water concentrations; however, since the tissue concentrations in the fish do not specify which river they are from, and not all fish (Loach) sources have reported corresponding values in these media there is uncertainty in the calculations.
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				

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Study Citation:		Hou, R., Liu, C., Gao, X., Xu, Y., Zha, J., Wang, Z. (2017). Accumulation and distribution of organophosphate flame retardants (PFRs) and their di-alkyl phosphates (DAPs) metabolites in different freshwater fish from locations around Beijing, China. Environmental Pollution 229:548-556.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		4165573		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 3:	Study Controls	High	Analytical controls were included.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to this type of study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Low	Conditions were not reported; additional detail may be in supporting document.
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to this type of study.
	Metric 8:	System Type and Design	High	Equilibrium is assumed in a field monitoring study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	Medium	Limited detail regarding the fish species collected; additional detail may be found in supporting document.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Some methodology and result details were not reported; additional detail may be found in supporting document.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Appropriate statistical analysis was used.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to information being reported in the supporting document which was not publicly available, evaluation of the reasonableness of the study results was not possible
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		Medium		

Study Citation:	Hou, R., Liu, C., Gao, X., Xu, Y., Zha, J., Wang, Z. (2017). Accumulation and distribution of organophosphate flame retardants (PFRs) and their di-alkyl phosphates (DAPs) metabolites in different freshwater fish from locations around Beijing, China. Environmental Pollution 229:548-556.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4165573

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not reported; tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Accumulation in different freshwater fish from locations around Beijing, China
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Accustandard, Inc. (New Haven, CT, USA); NR; 95-100% Notes: TCEP
Test Organism and Test Organism Details	top mouth gudgeon (<i>Pseudorasbora parva</i>), crucian carp (<i>Carassius auratus</i>) and loach (<i>Misgurnus anguillicaudatus</i>); Fish were collected from 9 locations in urban surface water in Beijing during
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; ambient; not reported; not reported
Media Type, TOC, and Salinity	natural water: freshwater; not reported; not reported
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported
Exposure Route, Elimination, and Nominal Measurements	natural environment; not reported; not reported
Test Type, Test Temperature, and Test Condition	field study; ambient; pilot field investigation of target chemicals in freshwater fish collected from bodies of water in Beijing, China
Comments	
Duration, Parameter, and Sampling Frequency	Samples collected in December 2015; other; not reported
Concentration	Not Reported
Analytical Method and Analytical Details	UPLC-MS/MS under positive electrospray ionization mode (ESI+); method blanks, limits of quantification and matrix effects for the determination of the target compounds are listed in the supplemental document.;
Rate Constant and Results per Recovery	not reported; recoveries listed in the supplemental document
Statistics, Basis, and Calculation Basis	not reported; Not Reported; BSAF
Results Value and Results Details	40; Mean whole-body BSAF = 40 (approximately, based on figure) For calculating BSAF, organic carbon of the sediment samples was not reported; but values without normalizing to organic carbon content could be calculated. Mean whole-body BSAF = 3.3 not normalized to OC of sediment and based only on the conc. in fish [ng/g lw] divided by conc. in sediment [ng/g dw] Tissue specific results (based on the conc. in tissue [ng/g lipid weight] divided by the average conc. in sediment [ng/g dw] for Crucian carp and Loach, respectively: BSAF muscle: 0.4 and 0.3 BSAF liver: 0.5 and 0.7 BSAF kidney: 0.5 and 0.3 BSAF intestine: 0.6 and 0.4 The tissue concentrations in the fish do not specify which river they are from, and not all fish (Loach) sources have reported corresponding values in these media there is uncertainty in the calculations.
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported

EVALUATION				
Domain		Metric	Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Analytical controls were included.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to this type of study.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Hou, R., Liu, C., Gao, X., Xu, Y., Zha, J., Wang, Z. (2017). Accumulation and distribution of organophosphate flame retardants (PFRs) and their di-alkyl phosphates (DAPs) metabolites in different freshwater fish from locations around Beijing, China. Environmental Pollution 229:548-556.			
OECD Harmonized Template: Aquatic Bioconcentration			
HERO ID: 4165573			
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method was suitable.
	Metric 6:	Testing Conditions	Low Conditions were not reported; additional detail may be in supporting document.
	Metric 7:	Testing Consistency	N/A This metric is not applicable to this type of study.
	Metric 8:	System Type and Design	High Equilibrium is assumed in a field monitoring study.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	Medium Limited detail regarding the fish species collected; additional detail may be found in supporting document.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High Sampling methods were appropriate.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	N/A This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	Low Some methodology and result details were not reported; additional detail may be found in supporting document.
	Metric 16:	Statistical Methods and Kinetic Calculations	High Appropriate statistical analysis was used.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	Low Due to information being reported in the supporting document which was not publicly available, evaluation of the reasonableness of the study results was not possible
	Metric 18:	QSAR Models	N/A This metric is not applicable to this type of study.
Overall Quality Determination		Medium	

Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6825744

Parameter	Data
EXTRACTION	
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BCF in contaminated pond
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	5 snakehead individuals (<i>Ophiocephalus argus</i>); provided in supporting information
Lipid Content, Test Temperature, pH, and Depuration Time	provided in supporting information; not applicable (field study); not applicable (field study); not applicable (field study)
Media Type, TOC, and Salinity	natural water; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from an enclosed e-waste polluted pond in Qingyuan, South China.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BCF; Samples collected December 2014
Concentration	84 - 114 ng/L
Analytical Method and Analytical Details	GC-MS/MS; provided in supporting information;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Pearson correlations were used to assess the relationships between TCEP concentration and lipid content, log Kow and log BCF, log Kow and log BSAF, and Ln C and delta15 N values of the organisms.; whole organism wet weight; other
Results Value and Results Details	8.48; blank corrected
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Calculated from C(biota)/C(water) by SRC

		EVALUATION		
Domain	Metric	Rating		Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.

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Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	6825744			
	EVALUATION			
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6825744

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BSAF
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	snakehead (Ophiocephalus argus)catfish (Clarias batrachus)mud carp (Cirrhinus molitorella)crucian carp (Carassius auratus)oriental river prawn (Macrobrachium nipponense); Not Reported
Lipid Content, Test Temperature, pH, and Depuration Time	provided in supporting information; not applicable (field study); not applicable (field study); not applicable (field study)
Media Type, TOC, and Salinity	Sediment; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from an enclosed e-waste polluted pond in Qingyuan, South China.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BSAF; Samples collected December 2014
Concentration	Not Reported
Analytical Method and Analytical Details	GC-MS/MS; provided in supporting information;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Not Reported; whole organism wet weight; other
Results Value and Results Details	0.171; BSAF 0.015 – 0.171 for Snakehead, Catfish, Large mud carp, Small mud carp, Crucian carp, Prawn. Calculated using information in the SI (converted log BSAF to BSAF and checked the calculations where $BSAF = (C\text{-biota}/Lipid\%)/(C\text{-sediment}/TOC)$).
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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Study Citation:		Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		6825744		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6825744

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BCF in contaminated pond
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	2 catfish individuals(Clarias batrachus); provided in supporting information
Lipid Content, Test Temperature, pH, and Depuration Time	provided in supporting information; not applicable (field study); not applicable (field study); not applicable (field study)
Media Type, TOC, and Salinity	natural water; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from an enclosed e-waste polluted pond in Qingyuan, South China.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BCF; Samples collected December 2014
Concentration	84 - 114 ng/L
Analytical Method and Analytical Details	GC-MS/MS; provided in supporting information;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Pearson correlations were used to assess the relationships between TCEP concentration and lipid content, log Kow and log BCF, log Kow and log BSAF, and Ln C and delta15 N values of the organisms.; whole organism wet weight; other
Results Value and Results Details	5.15; blank corrected
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Calculated from C(biota)/C(water) by SRC

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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Study Citation:		Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		6825744		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6825744

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BCF in contaminated pond
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	65 mud carp individuals (<i>Cirrhinus molitorella</i>); divided into two groups based on different size criteria: 5 individuals were the large size group (body length: 49±3.0 cm, weight: 1800±230 g) and 5 pooled samples were the small size group (body length: 8.2±1.1 cm, weight: 5.3±1.5 g) provided in supporting information; not applicable (field study); not applicable (field study); not applicable (field study)
Lipid Content, Test Temperature, pH, and Depuration Time	
Media Type, TOC, and Salinity	natural water; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from an enclosed e-waste polluted pond in Qingyuan, South China.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BCF; Samples collected December 2014
Concentration	84 - 114 ng/L
Analytical Method and Analytical Details	GC-MS/MS; provided in supporting information;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Pearson correlations were used to assess the relationships between TCEP concentration and lipid content, log Kow and log BCF, log Kow and log BSAF, and Ln C and delta15 N values of the organisms.; whole organism wet weight; other
Results Value and Results Details	3.64-3.94; blank corrected
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Calculated from C(biota)/C(water) by SRC

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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Study Citation:		Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		6825744		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6825744

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BCF in contaminated pond
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	16 crucian carp individuals (<i>Carassius auratus</i>); grouped in 5 pooled samples; more information provided in supporting document.
Lipid Content, Test Temperature, pH, and Depuration Time	provided in supporting information; not applicable (field study); not applicable (field study); not applicable (field study)
Media Type, TOC, and Salinity	natural water; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from an enclosed e-waste polluted pond in Qingyuan, South China.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BCF; Samples collected December 2014
Concentration	84 - 114 ng/L
Analytical Method and Analytical Details	GC-MS/MS; provided in supporting information;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Pearson correlations were used to assess the relationships between TCEP concentration and lipid content, log Kow and log BCF, log Kow and log BSAF, and Ln C and delta15 N values of the organisms.; whole organism wet weight; other
Results Value and Results Details	4.14; blank corrected
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Calculated from C(biota)/C(water) by SRC

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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Study Citation:		Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		6825744		
Domain	Metric	EVALUATION		Comments
	Metric 8:	System Type and Design	Rating	
			High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6825744

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BCF in contaminated pond
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	50 oriental river prawn individuals (Macrobrachium nipponense, grouped in 5 pooled samples); grouped in 5 pooled samples; more information provided in supporting document.
Lipid Content, Test Temperature, pH, and Depuration Time	provided in supporting information; not applicable (field study); not applicable (field study); not applicable (field study)
Media Type, TOC, and Salinity	natural water; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from an enclosed e-waste polluted pond in Qingyuan, South China.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BCF; Samples collected December 2014
Concentration	84 - 114 ng/L
Analytical Method and Analytical Details	GC-MS/MS; provided in supporting information;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Pearson correlations were used to assess the relationships between TCEP concentration and lipid content, log Kow and log BCF, log Kow and log BSAF, and Ln C and delta15 N values of the organisms.; whole organism wet weight; other
Results Value and Results Details	11.11; blank corrected
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Calculated from C(biota)/C(water) by SRC

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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		EVALUATION		
Domain	Metric	Rating	Comments	
Study Citation:	Liu, Y., Luo, X., Corella, P. Z., Zeng, Y., Mai, B. H. (2019). Organophosphorus flame retardants in a typical freshwater food web: Bioaccumulation factors, tissue distribution, and trophic transfer. Environmental Pollution 255 Pt. 2(Pt 2):113286.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	6825744			
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6629833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Organism and Test Organism Details	Carp; Cyprinus carpio
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	not specified; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	Not Reported; Not reported; Not reported
Comments	
Duration, Parameter, and Sampling Frequency	6 weeks; Not Reported; Not reported
Concentration	0.1 - 1 ppm
Analytical Method and Analytical Details	Not reported; Not reported;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Not reported; Not Reported
Results Value and Results Details	BCF test 1: <1.2-5.1; BCF test 2: 0.6-0.8; Test 1: 0.1 ppm; Test 2: 1 ppm
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	Medium	Test substance purity was not reported in the secondary source.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Study controls were not reported in the secondary source but may be available in the primary source.
	Metric 4: Test Substance Stability	Medium	Details regarding the test substance stability were not reported in the secondary source.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Medium	Details regarding the test method were not reported but may be available in the primary source.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.			
OECD Harmonized Template: Aquatic Bioconcentration			
HERO ID: 6629833			
	Metric 6:	Testing Conditions	Medium Testing conditions were not reported in the secondary source but may be available in the primary source.
	Metric 7:	Testing Consistency	Medium Details regarding the testing consistency were not reported in the secondary source.
	Metric 8:	System Type and Design	Medium The system type was not reported in the secondary source but may be available in the primary source.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High The organism type was reported; however, no details were provided in the secondary source.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	Medium The outcome assessment methodology was not reported in the secondary source.
	Metric 12:	Test Substance Purity	Medium Sampling methods were not reported in the secondary source but may be available in the primary source.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	Medium Details regarding this metric were not reported in the secondary report but may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium Attrition or health outcomes were not reported that would have had an impact on the study results.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	Medium Some details were omitted in the data reporting but may be available in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium The statistical methods were not reported in the secondary source but may be available in the primary source.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	Low Due to limited information, evaluation of the plausibility of the study results is not possible based on the secondary source.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: NITE; Chemical Risk Information Platform (CHRIP). Biodegradation and Bioconcentration. Tokyo, Japan: Natl Inst Tech Eval. Available from, as of Oct 16, 2014: <http://www.safe.nite.go.jp/english/db.html>

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6629833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Organism and Test Organism Details	Killifish; Not Reported
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	not specified; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	flow-through; Not reported; Not reported
Comments	
Duration, Parameter, and Sampling Frequency	Test 1: 5 days; Test 2: 11 days; Not Reported; Not reported
Concentration	2.3 - 12.7 ppm
Analytical Method and Analytical Details	Not reported; Not reported;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Not reported; Not Reported
Results Value and Results Details	BCF test 1: 1.1; BCF test 2: 1.3; Test 1: 12.7 ppm for 5 days; Test 2: 2.3 ppm for 11 days
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	Test substance purity was not reported in the secondary source.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Study controls were not reported in the secondary source but may be available in the primary source.
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance stability were not reported in the secondary source.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Details regarding the test method were not reported but may be available in the primary source.
	Metric 6:	Testing Conditions	Medium	Testing conditions were not reported in the secondary source but may be available in the primary source.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.				
OECD Harmonized Template: Aquatic Bioconcentration				
HERO ID: 6629833				
	Metric 7:	Testing Consistency	Medium	Details regarding the testing consistency were not reported in the secondary source.
	Metric 8:	System Type and Design	High	The system type was reported and is appropriate for the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The organism type was reported; however, no details were provided in the secondary source.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology was not reported in the secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were not reported in the secondary source but may be available in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Details regarding this metric were not reported in the secondary report but may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported that would have had an impact on the study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details were omitted in the data reporting but may be available in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	The statistical methods were not reported in the secondary source but may be available in the primary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the plausibility of the study results is not possible based on the secondary source.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Sasaki K et al; Bull Environ Contam Toxicol 28: 752-9 (1982)

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6629833

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Organism and Test Organism Details	Goldfish; Carassius auratus
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	not specified; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	static; Not reported; Not reported
Comments	
Duration, Parameter, and Sampling Frequency	72 hours; Not Reported; Not reported
Concentration	Not Reported
Analytical Method and Analytical Details	Not reported; Not reported;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Not reported; Not Reported
Results Value and Results Details	BCF=0.9; Not reported
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	Test substance purity was not reported in the secondary source.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Study controls were not reported in the secondary source but may be available in the primary source.
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance stability were not reported in the secondary source.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Details regarding the test method were not reported but may be available in the primary source.
	Metric 6:	Testing Conditions	Medium	Testing conditions were not reported in the secondary source but may be available in the primary source.

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Study Citation:		NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		6629833		
Domain	Metric	EVALUATION Rating	Comments	
	Metric 7:	Testing Consistency	Medium	Details regarding the testing consistency were not reported in the secondary source.
	Metric 8:	System Type and Design	Medium	The general system type was reported but no details were provided in the secondary source. However, the primary source may have more information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The organism type was reported; however, no details were provided in the secondary source.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology was not reported in the secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were not reported in the secondary source but may be available in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Details regarding this metric were not reported in the secondary report but may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported that would have had an impact on the study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details were omitted in the data reporting but may be available in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	The statistical methods were not reported in the secondary source but may be available in the primary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the plausibility of the study results is not possible based on the secondary source.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Sasaki K et al; Bull Environ Contam Toxicol 27: 775-82 (1981)

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	6629833

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Organism and Test Organism Details	Killifish; <i>Oryzias latipes</i>
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not reported
Media Type, TOC, and Salinity	not specified; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Not reported
Test Type, Test Temperature, and Test Condition	static; Not reported; Not reported
Comments	
Duration, Parameter, and Sampling Frequency	72 hours; Not Reported; Not reported
Concentration	Not Reported
Analytical Method and Analytical Details	Not reported; Not reported;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Not reported; Not Reported
Results Value and Results Details	BCF=2.2; Not reported
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	Test substance purity was not reported in the secondary source.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Study controls were not reported in the secondary source but may be available in the primary source.
	Metric 4:	Test Substance Stability	Medium	Details regarding the test substance stability were not reported in the secondary source.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Details regarding the test method were not reported but may be available in the primary source.
	Metric 6:	Testing Conditions	Medium	Testing conditions were not reported in the secondary source but may be available in the primary source.

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Study Citation:		NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		6629833		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 7:	Testing Consistency	Medium	Details regarding the testing consistency were not reported in the secondary source.
	Metric 8:	System Type and Design	Medium	The general system type was reported but no details were provided in the secondary source. However, the primary source may have more information.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The organism type was reported; however, no details were provided in the secondary source.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology was not reported in the secondary source.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were not reported in the secondary source but may be available in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Details regarding this metric were not reported in the secondary report but may be available in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Attrition or health outcomes were not reported that would have had an impact on the study results.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Some details were omitted in the data reporting but may be available in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	The statistical methods were not reported in the secondary source but may be available in the primary source.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the plausibility of the study results is not possible based on the secondary source.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

* Related References: Sasaki K et al; Bull Environ Contam Toxicol 27: 775-82 (1981)

Study Citation:	Sasaki, K., Suzuki, T., Takeda, M., Uchiyama, M. (1982). Bioconcentration and excretion of phosphoric acid triesters by killifish (<i>Oryzeas latipes</i>). Bulletin of Environmental Contamination and Toxicology 28(6):752-759.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4114737

EXTRACTION	
Parameter	Data
CASRN and Test Material	Not reported; TCEP
Confidentiality, Type, and Guideline	None; Experimental; other: Bioconcentration in Killifish (<i>Oryzias latipes</i>)
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Organism and Test Organism Details	killifish (<i>Oryzias latipes</i>); not reported
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; 25°C; not reported; not reported
Media Type, TOC, and Salinity	other; not reported; not reported
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported
Exposure Route, Elimination, and Nominal Measurements	not reported; 24 hours; measured concentrations during the test ranged from 2.1 to 2.4 ppm
Test Type, Test Temperature, and Test Condition	flow-through; 25°C; Flow speed 1000-2000 mL/hr
Comments	
Duration, Parameter, and Sampling Frequency	11 days; Not Reported; various intervals
Concentration	150 mg/mL
Analytical Method and Analytical Details	FPD-GC; Detail in previous report;
Rate Constant and Results per Recovery	biological half-life = 0.7 hours; not reported
Statistics, Basis, and Calculation Basis	not reported; Not Reported; Not Reported
Results Value and Results Details	1.2 to 1.4; BCR = Cbiota/Cwater
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Low	The source and purity of the test substance were not reported or verified by analytical means.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	No controls were reported.
	Metric 4:	Test Substance Stability	Low	The test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions				

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Study Citation:		Sasaki, K., Suzuki, T., Takeda, M., Uchiyama, M. (1982). Bioconcentration and excretion of phosphoric acid triesters by killifish (<i>Oryzeas latipes</i>). Bulletin of Environmental Contamination and Toxicology 28(6):752-759.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		4114737		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The test method was suitable.
	Metric 6:	Testing Conditions	Low	Details were not reported; some detail cited to previous paper.
	Metric 7:	Testing Consistency	High	Testing was consistent.
	Metric 8:	System Type and Design	High	The system was reported.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	Low	Details were not reported; some detail cited to previous paper.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods.
	Metric 12:	Test Substance Purity	Low	Detail regarding this metric were not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Detail regarding this metric were not reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Detail was omitted and cited in previous paper.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		Medium		

Study Citation:	Sasaki, K., Takeda, M., Uchiyama, M. (1981). TOXICITY ABSORPTION AND ELIMINATION OF PHOSPHORIC-ACID TRI ESTERS BY KILLIFISH ORYZIAS-LATIPES AND GOLDFISH CARASSIUS-AURATUS. Bulletin of Environmental Contamination and Toxicology 27(6):775-782.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	2727461

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Non-guideline
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Tokyo Kasei Industry Co.; Not reported; Not reported
Test Organism and Test Organism Details	Killifish; Oryzias latipes, weighing 0.1-0.2g, purchased from a market and acclimated to laboratory conditions for 10 days at 25°C.
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 25°C; Not reported; Not reported
Media Type, TOC, and Salinity	Tap water passed through an activated charcoal column; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Adjusted to roughly 1-3 ppm
Test Type, Test Temperature, and Test Condition	Static; 25°C; Fish were not fed 48 hours before and during the experiment. Water was kept at 25C without aeration.
Comments	
Duration, Parameter, and Sampling Frequency	72 hours; Not reported; 5 samples were collected over the test duration.
Concentration	1 - 3 ppm
Analytical Method and Analytical Details	Gas liquid chromatography; Water was extracted with hexane. 1-4 fish were ground with 20g anhydrous sodium sulfate and extracted with 30 mL ethyl acetate.;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Whole body; Not reported
Results Value and Results Details	Bioconcentration ratio after approximately 72 and 90: 2.2 and 2.2.; Not Reported
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.	
	Metric 2: Test Substance Purity	Medium	The test substance purity was not reported; however, the omission is unlikely to have a substantial impact on the study results.	
Domain 2: Test Design	Metric 3: Study Controls	High	Appropriate controls were reported.	
	Metric 4: Test Substance Stability	Medium	Some details regarding the test substance preparation and storage conditions were not reported; however, the omissions are unlikely to have an impact on the study results.	
Domain 3: Test Conditions				

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Study Citation:	Sasaki, K., Takeda, M., Uchiyama, M. (1981). TOXICITY ABSORPTION AND ELIMINATION OF PHOSPHORIC-ACID TRI ESTERS BY KILLIFISH ORYZIAS-LATIPES AND GOLDFISH CARASSIUS-AURATUS. Bulletin of Environmental Contamination and Toxicology 27(6):775-782.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	2727461			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance and the target chemical was tested at concentrations below its aqueous solubility.
	Metric 6:	Testing Conditions	Medium	Some of the testing conditions were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Low	The number of study groups used was not reported which may have an impact on the study results.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established but this was unlikely to have a substantial impact on the study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	Some details regarding the test organism were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Uncertainty in the concentration measurements was not reported which may have an impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and adverse health outcomes were investigated.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Some details regarding the analytical method and reported bioconcentration ratios were not reported which may have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis and kinetic calculations were not reported which may have a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study results.

Overall Quality Determination**Medium**

Study Citation:	Sasaki, K., Takeda, M., Uchiyama, M. (1981). TOXICITY ABSORPTION AND ELIMINATION OF PHOSPHORIC-ACID TRI ESTERS BY KILLIFISH ORYZIAS-LATIPES AND GOLDFISH CARASSIUS-AURATUS. Bulletin of Environmental Contamination and Toxicology 27(6):775-782.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	2727461

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Non-guideline
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Tokyo Kasei Industry Co.; Not reported; Not reported
Test Organism and Test Organism Details	Goldfish; Carassius auratus, weighing 0.8-2.8g, purchased from a market and acclimated to laboratory conditions for 10 days at 25°C.
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 25°C; Not reported; Not reported
Media Type, TOC, and Salinity	Tap water passed through an activated charcoal column; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Not reported; Not reported; Adjusted to roughly 1-3 ppm
Test Type, Test Temperature, and Test Condition Comments	Static; 25°C; Fish were not fed 48 hours before and during the experiment. Water was kept at 25C without aeration.
Duration, Parameter, and Sampling Frequency Concentration	72 hours; Not reported; 5 samples were collected over the test duration. 1 - 3 ppm
Analytical Method and Analytical Details	Gas liquid chromatography; Water was extracted with hexane. 1-4 fish were ground with 20g anhydrous sodium sulfate and extracted with 30 mL ethyl acetate.;
Rate Constant and Results per Recovery	Not reported; Not reported
Statistics, Basis, and Calculation Basis	Not reported; Whole body; Not reported
Results Value and Results Details	Bioconcentration ratio after approximately 48 and 90 hours: 0.7 and 0.9; Not Reported
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	The test substance purity was not reported; however, the omission is unlikely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3:	Study Controls	High	Appropriate controls were reported.
	Metric 4:	Test Substance Stability	Medium	Some details regarding the test substance preparation and storage conditions were not reported; however, the omissions are unlikely to have an impact on the study results.
Domain 3: Test Conditions	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance and the target chemical was tested at concentrations below it's aqueous solubility.

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Study Citation:		Sasaki, K., Takeda, M., Uchiyama, M. (1981). TOXICITY ABSORPTION AND ELIMINATION OF PHOSPHORIC-ACID TRI ESTERS BY KILLIFISH ORYZIAS-LATIPES AND GOLDFISH CARASSIUS-AURATUS. Bulletin of Environmental Contamination and Toxicology 27(6):775-782.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		2727461		
Domain	Metric	EVALUATION Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Some of the testing conditions were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7:	Testing Consistency	Low	The number of study groups used was not reported which may have an impact on the study results.
	Metric 8:	System Type and Design	Medium	Equilibrium was not established but this was unlikely to have a substantial impact on the study results.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	Medium	Some details regarding the test organism were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There were minor differences between the assessment methodology and the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Uncertainty in the concentration measurements was not reported which may have an impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	There were multiple study groups, and adverse health outcomes were investigated.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Some details regarding the analytical method and reported bioconcentration ratios were not reported which may have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis and kinetic calculations were not reported which may have a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study results.
Overall Quality Determination			Medium	

Study Citation:	Sutton, R., Chen, D., Sun, J., Greig, D. J., Wu, Y. (2019). Characterization of brominated, chlorinated, and phosphate flame retardants in San Francisco Bay, an urban estuary. Science of the Total Environment 652:212-223.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5880799

		EXTRACTION
Parameter	Data	
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate	
Confidentiality, Type, and Guideline	None; Experimental; other: BSAF	
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR	
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR	
Test Organism and Test Organism Details	Bivalves and Harbor Seals; Harbor Seal Blubber	
Lipid Content, Test Temperature, pH, and Depuration Time	lipid-normalized concentration not reported; not applicable (field study); not applicable (field study); not applicable (field study)	
Media Type, TOC, and Salinity	Sediment; not applicable (field study); not applicable (field study)	
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)	
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured	
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from San Francisco Bay.	
Comments		
Duration, Parameter, and Sampling Frequency	not applicable (field study); BSAF; Water and sediment samples collected in 2013, blubber in June 2014, bivalves were transplanted for 90 days	
Concentration	Not Reported	
Analytical Method and Analytical Details	GC-MS/MS and LC-MS/MS; Not Reported;	
Rate Constant and Results per Recovery	not applicable (field study); Not reported	
Statistics, Basis, and Calculation Basis	Not Reported; lipid weight (lw); other	
Results Value and Results Details	Not calculated; median concentration of TCEP in sediment was not detected; Not Reported	
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Not Reported	

		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.

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Study Citation:		Sutton, R., Chen, D., Sun, J., Greig, D. J., Wu, Y. (2019). Characterization of brominated, chlorinated, and phosphate flame retardants in San Francisco Bay, an urban estuary. Science of the Total Environment 652:212-223.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		5880799		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Sutton, R., Chen, D., Sun, J., Greig, D. J., Wu, Y. (2019). Characterization of brominated, chlorinated, and phosphate flame retardants in San Francisco Bay, an urban estuary. <i>Science of the Total Environment</i> 652:212-223.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5880799

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: BCF
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	Bivalves and Harbor Seals; Harbor Seal Blubber
Lipid Content, Test Temperature, pH, and Depuration Time	lipid-normalized concentration not reported; not applicable (field study); not applicable (field study); not applicable (field study)
Media Type, TOC, and Salinity	natural water; not applicable (field study); not applicable (field study)
Dissolved Oxygen, Conductivity, and Hardness	not applicable (field study); not applicable (field study); not applicable (field study)
Exposure Route, Elimination, and Nominal Measurements	whole body; not applicable (field study); Measured
Test Type, Test Temperature, and Test Condition	field study; not applicable (field study); Samples were collected from San Francisco Bay.
Comments	
Duration, Parameter, and Sampling Frequency	not applicable (field study); BCF; Water and sediment samples collected in 2013, blubber in June 2014, bivalves were transplanted for 90 days
Concentration	Not Reported
Analytical Method and Analytical Details	GC-MS/MS and LC-MS/MS; Not Reported;
Rate Constant and Results per Recovery	not applicable (field study); Not reported
Statistics, Basis, and Calculation Basis	Not Reported; lipid weight (lw); other
Results Value and Results Details	0.00014 L/kg (Calculated from Harbor seal and water samples from San Francisco bay); BCF = Cbiota/Cwater = 3.4 ng/g/lw in Harbor seal)/(24 ng/L);not detected in bivalves
Metabolites, Reference, and Results Reference Substance	not applicable (field study); not applicable (field study); Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source was not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Testing conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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Study Citation:		Sutton, R., Chen, D., Sun, J., Greig, D. J., Wu, Y. (2019). Characterization of brominated, chlorinated, and phosphate flame retardants in San Francisco Bay, an urban estuary. Science of the Total Environment 652:212-223.		
OECD Harmonized Template:		Aquatic Bioconcentration		
HERO ID:		5880799		
Domain	Metric	EVALUATION		Comments
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to the study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were consistent with related physical chemical properties.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Tang, B., Poma, G., Bastiaensen, M., Yin, S. S., Luo, X. J., Mai, B. X., Covaci, A. (2019). Bioconcentration and biotransformation of organophosphorus flame retardants (PFRs) in common carp (<i>Cyprinus carpio</i>). Environment International 126:512-522.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5167286

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, and Guideline	None; Experimental; OECD Guideline 305 (Bioaccumulation in Fish: Aqueous and Dietary Exposure) -I: Aqueous Exposure Bioconcentration Fish Test
Solvent, Reactivity, Storage, Stability	DMSO (0.01% v/v in exposure medium); NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: Mix of organophosphorus flame retardants: tri-n-butyl phosphate, tris(chloroethyl) phosphate, tris(2-chloroisopropyl) phosphate, tris(1,3-dichloro-2-propyl) phosphate, triphenyl phosphate, 2-ethylhexyldiphenyl phosphate, and tris(2-butoxyethyl) phosphate
Test Organism and Test Organism Details	Common carp, <i>Cyprinus carpio</i> ; n=32, average length 9.71±0.18 cm, average weight 28.64±0.88 g
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 24 to 25°C; 6.5 to 7.5; 14 days
Media Type, TOC, and Salinity	other; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	7.8 to 8.4 mg/L; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Fish transferred to dechlorinated tap water, renewed daily; Measured: 9.1±0.2 ug/L; Nominal of each in mixture of 7 organophosphorus flame retardants (TCEP, TNBP, TBOEP, TCIPP, TDCIPP, TPHP, and EHDPHP): 10 ug/L
Test Type, Test Temperature, and Test Condition	semi-static; 24 to 25°C; Half of exposure solution renewed daily with test substance spiked (10 ug/L) dechlorinated water
Comments	
Duration, Parameter, and Sampling Frequency	28 days; DT50; 3, 7, 14, 21, and 28 days(uptake); 3, 7, and 14 days(depuration)
Concentration	9.1 µg/L
Analytical Method and Analytical Details	GC-MS/MS with EI source in electron impact mode; metabolites analyzed by LC-MS/MS with ESI; LOQ: 0.10 - 1.5 ng/g ww (tissue), 0.10 - 0.72 ng/L (water); Metabolites: tissue, food, and feces samples ultrasonic extracted 2x with methanol, evaporated under N2, reconstituted with water/methanol; serum extracted on Bond Elut-C18 cartridge, evaporated under N2, reconstituted with water/methanol;
Rate Constant and Results per Recovery	Uptake/Depuration k: >1.5/>1.5 (muscle), >7.1/>7.1 (liver), >2.8/>1.6 (gonad), >3.7/>1.4 (brain), >2.8/>1.8 (gill), >1.7/>1.1 (kidney), >1.3/>0.9 (intestine), >6.4/>1.7 (serum) /d; Spiked metabolite: 81 - 138% (muscle), 83-136% (serum), Internal standard: 92 - 102% (muscle), 80 - 92% (serum)
Statistics, Basis, and Calculation Basis	SPSS 21; Tissue and serum, wet wt.; kinetic
Results Value and Results Details	BCFk: 1 (muscle), 4.2 (liver), 1.7 (gonad), 2.6 (brain), 1.6 (gill), 1.6 (kidney), 1.5 (intestine), 3.8 (serum) L/kg; Half-life: < 11.3 (muscle), < 9.9 (liver), < 10.3 (gonad), < 12.0 (brain), < 9.2 (gill), < 15.1 (kidney), < 18.3 (intestine), < 10.0 (serum)
Metabolites, Reference, and Results Reference Substance	Bis(chloroethyl) phosphate; Control fish (0.01% v/v DMSO); 0.12±0.20 ng/g ww in tissue

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The test substance source and purity was not reported, may be reported in supplemental information.
Domain 2: Test Design			

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Study Citation:	Tang, B., Poma, G., Bastiaensen, M., Yin, S. S., Luo, X. J., Mai, B. X., Covaci, A. (2019). Bioconcentration and biotransformation of organophosphorus flame retardants (PFRs) in common carp (<i>Cyprinus carpio</i>). <i>Environment International</i> 126:512-522.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5167286			
Domain	Metric	EVALUATION		Comments
	Metric 3:	Study Controls	High	Control organisms were included and chemical concentrations were detected within a valid range.
	Metric 4:	Test Substance Stability	Medium	The test substance preparation was reported, storage conditions were not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method followed OECD guidelines and was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	High	Semi-static equilibrium was established and concentrations were analytically monitored.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	The organism species, length, and weight was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining bioaccumulation.
	Metric 12:	Test Substance Purity	High	Sampling methods focused on several tissues and were collected at an appropriate frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; extraction recovery and limits of detection were reported. Lipid content was not reported, it is not clear if values were lipid normalized although lipid content was measured. Raw data was not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the OECD guideline and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

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Study Citation: Tang, B., Poma, G., Bastiaensen, M., Yin, S. S., Luo, X. J., Mai, B. X., Covaci, A. (2019). Bioconcentration and biotransformation of organophosphorus flame retardants (PFRs) in common carp (*Cyprinus carpio*). *Environment International* 126:512-522.

OECD Harmonized Template: Aquatic Bioconcentration

HERO ID: 5167286

Domain	Metric	EVALUATION Rating	Comments
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Study Citation:	Tang, B., Poma, G., Bastiaensen, M., Yin, S. S., Luo, X. J., Mai, B. X., Covaci, A. (2019). Bioconcentration and biotransformation of organophosphorus flame retardants (PFRs) in common carp (<i>Cyprinus carpio</i>). <i>Environment International</i> 126:512-522.		
OECD Harmonized Template:	Aquatic Bioconcentration		
HERO ID:	5167286		
EXTRACTION			
Parameter	Data		
CASRN and Test Material	115-96-8; TCEP		
Confidentiality, Type, and Guideline	None; Experimental; OECD Guideline 305 (Bioaccumulation in Fish: Aqueous and Dietary Exposure) -I: Aqueous Exposure Bioconcentration Fish Test		
Solvent, Reactivity, Storage, Stability	DMSO (0.01% v/v in exposure medium); NR; NR; NR		
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: Mix of organophosphorus flame retardants: tri-n-butyl phosphate, tris(chloroethyl) phosphate, tris(2-chloroisopropyl) phosphate, tris(1,3-dichloro-2-propyl) phosphate, triphenyl phosphate, 2-ethylhexyldiphenyl phosphate, and tris(2-butoxyethyl) phosphate		
Test Organism and Test Organism Details	Common carp, <i>Cyprinus carpio</i> ; n=32, average length 9.71±0.18 cm, average weight 28.64±0.88 g		
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; 24 to 25°C; 6.5 to 7.5; 14 days		
Media Type, TOC, and Salinity	other; Not reported; Not reported		
Dissolved Oxygen, Conductivity, and Hardness	7.8 to 8.4 mg/L; Not reported; Not reported		
Exposure Route, Elimination, and Nominal Measurements	Water; Fish transferred to dechlorinated tap water, renewed daily; Measured: 9.1±0.2 ug/L; Nominal of each in mixture of 7 organophosphorus flame retardants (TCEP, TNBP, TBOEP, TCIPP, TDCIPP, TPHP, and EHDPHP): 10 ug/L		
Test Type, Test Temperature, and Test Condition	semi-static; 24 to 25°C; Half of exposure solution renewed daily with test substance spiked (10 ug/L) dechlorinated water		
Comments			
Duration, Parameter, and Sampling Frequency	28 days; DT50; 3, 7, 14, 21, and 28 days (uptake); 3, 7, and 14 days (depuration)		
Concentration	9.1 µg/L		
Analytical Method and Analytical Details	GC-MS/MS with EI source in electron impact mode; metabolites analyzed by LC-MS/MS with ESI; LOQ: 0.10 - 1.5 ng/g ww (tissue), 0.10 - 0.72 ng/L (water); Metabolites: tissue, food, and feces samples ultrasonic extracted 2x with methanol, evaporated under N ₂ , reconstituted with water/methanol; serum extracted on Bond Elut-C18 cartridge, evaporated under N ₂ , reconstituted with water/methanol;		
Rate Constant and Results per Recovery	Not Reported; Spiked metabolite: 81 - 138% (muscle), 83-136% (serum), Internal standard: 92 - 102% (muscle), 80 - 92% (serum)		
Statistics, Basis, and Calculation Basis	Negative correlation between log K _{ow} and serum (R ² =0.53, p < 0.04); positive correlation between log K _{ow} and tissues (R ² =0.66 -0.81, p < 0.02); no significant difference between tissue concentrations except for serum (one-way ANOVA, p > 0.05); Tissue and serum, wet wt.; steady state		
Results Value and Results Details	BCF _{ss} : 1.0±0.1 (muscle), 4.3±0.2 (liver), 1.8±0.1 (gonad), 2.6±0.2 (brain), 1.6±0.1 (gill), 1.6±0.1 (kidney), 1.5±0.1 (intestine), 3.8±0.2 (serum) L/kg; Not correlated to lipid content possible due to relatively low log K _{ow}		
Metabolites, Reference, and Results Reference Substance	Bis(chloroethyl) phosphate; Control fish (0.01% v/v DMSO); 0.12±0.20 ng/g ww in tissue		
EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified by name.
	Metric 2:	Test Substance Purity	Medium The test substance source and purity was not reported, may be reported in supplemental information.
Domain 2: Test Design			
	Metric 3:	Study Controls	High Control organisms were included and chemical concentrations were detected within a valid range.

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Study Citation:	Tang, B., Poma, G., Bastiaensen, M., Yin, S. S., Luo, X. J., Mai, B. X., Covaci, A. (2019). Bioconcentration and biotransformation of organophosphorus flame retardants (PFRs) in common carp (<i>Cyprinus carpio</i>). <i>Environment International</i> 126:512-522.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5167286			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	Medium	The test substance preparation was reported, storage conditions were not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method followed OECD guidelines and was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Appropriate test conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across samples and study groups.
	Metric 8:	System Type and Design	High	Semi-static equilibrium was established and concentrations were analytically monitored.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	The organism species, length, and weight was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining bioaccumulation.
	Metric 12:	Test Substance Purity	High	Sampling methods focused on several tissues and were collected at an appropriate frequency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No notable sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; extraction recovery and limits of detection were reported. Lipid content was not reported, it is not clear if values were lipid normalized although lipid content was measured. Raw data was not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were reported and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the OECD guideline and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Wang, G., Shi, H., Du, Z., Chen, H., Peng, J., Gao, S. (2017). Bioaccumulation mechanism of organophosphate esters in adult zebrafish (Danio rerio). Environmental Pollution 229:177-187.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	4117180

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, and Guideline	None; Experimental; other: Modified OECD 305, semi-static aqueous exposure fish test
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	d12-TCEP from Cambridge Isotope Laboratories (Tewksbury, MA, U.S.A.); Sigma-Aldrich (St. Louis, MO, USA); NR; $\geq 97\%$
Test Organism and Test Organism Details	Adult zebrafish (Danio rerio) (n=10); length 39 ± 3 mm; weight 475 ± 30 mg
Lipid Content, Test Temperature, pH, and Depuration Time	Reported graphically; $24 \pm 1^\circ\text{C}$; 7.1 ± 0.2 ; 3 days
Media Type, TOC, and Salinity	natural water: freshwater; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	aqueous solution; Not reported; Measured
Test Type, Test Temperature, and Test Condition Comments	semi-static; $24 \pm 1^\circ\text{C}$; Low concentration 1/150 LC50 concentration for the low concentration group and 1/30 LC50 for the high concentration group
Duration, Parameter, and Sampling Frequency	22 days total: 19 days exposure followed by 3 days for depuration; DT50; Day 3, 7, 11, 12, 14, 16, 19, 20, 21, 22
Concentration	893 ± 46 - 4620 ± 158 $\mu\text{g/L}$
Analytical Method and Analytical Details	GC-MS; Poly-serve PSD solid-phase extraction in ethyl acetate solution, concentrated prior to GC-MS.;
Rate Constant and Results per Recovery	Uptake rate constants (h-1): >0.1 - >0.3 (low dose group); >0.1 - >0.2 (high dose group); depuration rate constants (h-1): >3.2 - >3.4 (low dose group); >3.4 - >3.6 (high dose group) (Reported in supplemental information file); 84.9 (7.7% RSD) to 95.7% (4.8% RSD) in tissue and 95.6 (2.4% RSD) to 97.4 (2.6% RSD) in water
Statistics, Basis, and Calculation Basis	Relative standard deviation (RSD); one-way ANOVA with Tukey's multiple comparison tests, $p < 0.05$. MQL's were 1.1 - 7.2 ng/g; organ w.w. and l.w. reported; steady state
Results Value and Results Details	BCF-ww = 0.5 ± 0.1 to 1.8 ± 0.1 and BCF-lw = 22.2 ± 1.5 to 33.7 ± 2.7 for the high concentration group; Reported in supplemental information file: Half-life in intestine, liver, roe, brain, muscle, gill: Low group (hr): <4.9 to <5.3 and High group (hr): <4.7 to <4.8 (Reported in supplemental information file)High conc (BCF-ww): 1.3 ± 0.1 (intestine), 1.8 ± 0.1 (liver), 1.7 ± 0.1 (roe), 1.5 ± 0.1 (brain), 0.5 ± 0.1 (muscle), 1.3 ± 0.1 (gill)Low conc (BCF-ww): 1.7 ± 0.2 (intestine), 2.4 ± 0.1 (liver), 2.4 ± 0.1 (roe), 2.2 ± 0.1 (brain), 0.8 ± 0.1 (muscle), 1.9 ± 0.2 (gill)High conc (BCF-lw): 28.6 ± 2.3 (intestine), 22.2 ± 1.5 (liver), 22.3 ± 0.1 (roe), 22.5 ± 1.8 (brain), 30.6 ± 3.1 (muscle), 33.7 ± 2.7 (gill)Low conc (BCF-lw): 36.9 ± 3.4 (intestine), 29.7 ± 1.8 (liver), 30.9 ± 1.4 (roe), 34.1 ± 0.1 (brain), 43.7 ± 2.6 (muscle), 46.5 ± 4.0 (gill)
Metabolites, Reference, and Results Reference Substance	Not Reported; Sample blanks; All blanks were below the MDLs

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported.
Domain 2: Test Design				

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Study Citation:	Wang, G., Shi, H., Du, Z., Chen, H., Peng, J., Gao, S. (2017). Bioaccumulation mechanism of organophosphate esters in adult zebrafish (Danio rerio). Environmental Pollution 229:177-187.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	4117180			
Domain	Metric	EVALUATION		Comments
	Metric 3:	Study Controls	Medium	Controls were used and were valid.
	Metric 4:	Test Substance Stability	Medium	Test substance storage conditions were not reported, but may be reported in supplemental information.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	OECD test guideline study 305 was used.
	Metric 6:	Testing Conditions	Medium	Some test conditions were not reported but may be reported in supplemental information.
	Metric 7:	Testing Consistency	High	Test conditions were consistent across all samples.
	Metric 8:	System Type and Design	High	Steady state was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organism details and source were reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	Results addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods and approaches were described.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Statistical techniques were used in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in study groups influenced the outcome assessment.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Percent recovery, analytical methods, lipid-normalized BCF, and method detection limits were reported in supplemental information file.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Values were within the expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Wang, X., Zhong, W., Xiao, B., Liu, Q., Yang, L., Covaci, A., Zhu, L. (2019). Bioavailability and biomagnification of organophosphate esters in the food web of Taihu Lake, China: Impacts of chemical properties and metabolism. <i>Environment International</i> 125:25-32.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5165945

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; field study of bioaccumulation of organophosphate esters (OPEs)
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples freeze-dried, ground, homogenized, stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Zhushan Bay, Taihu Lake, China; NA; NA Notes: Analytical standard obtained from AccuStandard Inc., USA. TCEP-d12 obtained from Toronto Research Chemicals Inc., Canada.
Test Organism and Test Organism Details	Phytoplankton (n=3), zoo plankton (n=3), 6 species of invertebrates (n=160), and 15 species of fish (n=380); invertebrates included Taihu Lake shrimp (n=30), white shrimp (n=30), bivalve (n=20), pearl mussel (n=20), freshwater mussel (n=20) and snail (n=40); fish species included silver carp (n=10), common carp (n=20), crucian carp (n=20), lake anchovy (n=20), whitebait (n=200), Mongolian culter (n=10), Chinese bitterling (n=10), gobies (n=10), yellow catfish (n=10), snakehead fish (n=10), bream (n=10), beardless sucking bard (n=10), topmouth gudgeon (n=20), catfish (n=10), loach (n=10); more description are provided in supplementary document
Lipid Content, Test Temperature, pH, and Depuration Time	Information provided in supplementary document; Not reported; Not reported; Not applicable
Media Type, TOC, and Salinity	natural water / sediment; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured, average total OPEs 1150 ng/L, 17.4% of which was TCEP (0.174 x 1150 ng/L=200 ng/L conc in water)
Test Type, Test Temperature, and Test Condition	field study; Not reported; Field study in Zhushan Bay, Taihu Lake, China
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; June 2016
Concentration	200 ng/L
Analytical Method and Analytical Details	UPLC-MS/MS; analytes separated on Waters BEH C18 column; Filtered water concentrated on ENVI-C18 cartridge; homogenized organism sample mixed with anhydrous Na2SO4, ultra-sonicated extracted 3x with acetonitrile, evaporated under N2, redissolved in acetonitrile;
Rate Constant and Results per Recovery	Not applicable; 72.3-138% water (TCEP=98.6%), 95.1-115% fish muscle homogenate (TCEP=107.8%)
Statistics, Basis, and Calculation Basis	IBM SPSS Statistics v21. OPE concentrations did not show significant correlation with lipid content (p > 0.05); Soft tissue (invertebrate), organ (fish except whitebait which was whole body), wet wt.; steady state
Results Value and Results Details	Log BAF = 0.80 ± 0.33 (invertebrates), 0.43 ± 0.11 (pelagic fish), 0.63 ± 0.24 (benthic fish); Detection frequencies (out of OPEs detected): 11.5% in pelagic and benthic fish; was not detected in plankton due to very low lipid content of plankton and low hydrophobicity of TCEP.
Metabolites, Reference, and Results Reference Substance	Not applicable; Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The source of the samples collected was reported generally, and the source of analytical standards was reported.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: Wang, X., Zhong, W., Xiao, B., Liu, Q., Yang, L., Covaci, A., Zhu, L. (2019). Bioavailability and biomagnification of organophosphate esters in the food web of Taihu Lake, China: Impacts of chemical properties and metabolism. Environment International 125:25-32.				
OECD Harmonized Template: Aquatic Bioconcentration				
HERO ID: 5165945				
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Analytical or field blanks were not explicitly included.
	Metric 4:	Test Substance Stability	High	Minimal details on sample preparation were reported but may be reported elsewhere; sample storage methods only reported for organisms.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The field study method was appropriate for the test substance.
	Metric 6:	Testing Conditions	Medium	No environmental conditions or sample characteristics were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Organism species were reported, other characteristics may be included in supplementary information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for bioaccumulation determination.
	Metric 12:	Test Substance Purity	Medium	Sampling frequency was not reported, may have been one sampling campaign. Number of environmental samples was not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Environmental values were only reported as summaries.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate; extraction efficiencies were reported. Limits of detection and lipid content were not reported. Raw data for concentrations in organisms and the environment were not reported. BAFs reported in supplementary material.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the method but the focus of the study was overall trends in biomagnification not specific bioaccumulation values; species specific bioaccumulation factors were not determined, detections in organisms were reported in supplementary material.

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Study Citation:	Wang, X., Zhong, W., Xiao, B., Liu, Q., Yang, L., Covaci, A., Zhu, L. (2019). Bioavailability and biomagnification of organophosphate esters in the food web of Taihu Lake, China: Impacts of chemical properties and metabolism. Environment International 125:25-32.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5165945

		EVALUATION		
Domain	Metric	Rating		Comments
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination

High

Study Citation:	Wang, X., Zhong, W., Xiao, B., Liu, Q., Yang, L., Covaci, A., Zhu, L. (2019). Bioavailability and biomagnification of organophosphate esters in the food web of Taihu Lake, China: Impacts of chemical properties and metabolism. Environment International 125:25-32.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5165945

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; field study of bioaccumulation of organophosphate esters (OPEs)
Solvent, Reactivity, Storage, Stability	NA; NR; Organism samples freeze-dried, ground, homogenized, stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Zhushan Bay, Taihu Lake, China; NA; NA Notes: Analytical standard obtained from AccuStandard Inc., USA. TCEP-d12 obtained from Toronto Research Chemicals Inc., Canada.
Test Organism and Test Organism Details	6 species of invertebrates and benthic fish; n=160; more description are provided in supplementary document
Lipid Content, Test Temperature, pH, and Depuration Time	provided in supplementary document; Not reported; Not reported; Not applicable
Media Type, TOC, and Salinity	natural water / sediment; Not reported; Not reported
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported
Exposure Route, Elimination, and Nominal Measurements	Sediment; Not applicable; Measured, average total OPEs 40.4 ng/g dw, 14.8% of which was TCEP
Test Type, Test Temperature, and Test Condition	field study; Not reported; Field study in Zhushan Bay, Taihu Lake, China
Comments	
Duration, Parameter, and Sampling Frequency	Not applicable; Not Reported; June 2016
Concentration	5.99 ng/g dw
Analytical Method and Analytical Details	UPLC-MS/MS; analytes separated on Waters BEH C18 column; freeze-dried sediment extracted with acetonitrile and concentrated and cleaned on ENVI-18 cartridge; homogenized organism sample mixed with anhydrous Na2SO4, ultra-sonicated extracted 3x with acetonitrile, evaporated under N2, redissolved in acetonitrile;
Rate Constant and Results per Recovery	Not applicable; 74.4-124% sediment (TCEP=104.9%), 95.1-115% fish muscle homogenate (TCEP=107.8%)
Statistics, Basis, and Calculation Basis	IBM SPSS Statistics v21. OPE concentrations did not show significant correlation with lipid content (p > 0.05); Soft tissue (invertebrate), wet wt., lipid normalized; steady state
Results Value and Results Details	log BSAF: -2.66±0.33 (invertebrates) and -2.83±0.24 (benthic fishes); Concentration in sediment normalized by TOC, organism concentration lipid normalized. Log BSAF increased with log Kow range 1.44 - 5.73 at first then decreased afterwards. Accumulation limited at very high log Kow due to difficulty of desorption from sediment. Benthic invertebrates identified as more appropriate than fish for study of bioavailability in sediment.
Metabolites, Reference, and Results Reference Substance	Not applicable; Not reported; Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The chemical of interest was identified by name.
	Metric 2:	Test Substance Purity	High The source of the samples collected was reported generally, and the source of analytical standards was reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	High Analytical or field blanks were not explicitly included.

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Study Citation:	Wang, X., Zhong, W., Xiao, B., Liu, Q., Yang, L., Covaci, A., Zhu, L. (2019). Bioavailability and biomagnification of organophosphate esters in the food web of Taihu Lake, China: Impacts of chemical properties and metabolism. Environment International 125:25-32.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	5165945			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	High	Minimal details on sample preparation were reported but may be reported elsewhere; sample storage methods only reported for organisms.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The field study method was appropriate for the test substance.
	Metric 6:	Testing Conditions	Medium	No environmental conditions or sample characteristics were reported.
	Metric 7:	Testing Consistency	High	Samples were processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Organism species were reported, other characteristics may be included in supplemental information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for bioaccumulation determination.
	Metric 12:	Test Substance Purity	Medium	Sampling frequency was not reported, may have been one sampling campaign. Number of environmental samples was not reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Values were only reported graphically and not species specific. Environmental values were only reported as summaries.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate; extraction efficiencies were reported. Limits of detection and lipid content were not reported. Raw data for concentrations in organisms and the environment were not reported. BAFs reported in supplemental material.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results are reasonable based on the method but the focus of the study was overall trends in biomagnification not specific bioaccumulation values; species specific bioaccumulation factors were not determined, detections in organisms were reported in supplemental material.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	Wang, X., Zhong, W., Xiao, B., Liu, Q., Yang, L., Covaci, A., Zhu, L. (2019). Bioavailability and biomagnification of organophosphate esters in the food web of Taihu Lake, China: Impacts of chemical properties and metabolism. Environment International 125:25-32.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5165945

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Wei, G. L., Li, D. Q., Zhuo, M. N., Liao, Y. S., Xie, Z. Y., Guo, T. L., Li, J. J., Zhang, S. Y., Liang, Z. Q. (2014). Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environmental Pollution 196C:29-46.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	2534603

Parameter	Data	EXTRACTION
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate	
Confidentiality, Type, and Guideline	None; not specified; other: not specified	
Solvent, Reactivity, Storage, Stability	Not Reported; NR; NR; NR	
Radiolabel, Source, State, Purity	None; NR; NR; NR Notes: TCEP	
Test Organism and Test Organism Details	not reported; not reported	
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; not reported; not reported; not reported	
Media Type, TOC, and Salinity	not specified; not reported; not reported	
Dissolved Oxygen, Conductivity, and Hardness	not reported; not reported; not reported	
Exposure Route, Elimination, and Nominal Measurements	not reported; not reported; not reported	
Test Type, Test Temperature, and Test Condition	not reported; not reported; Not Reported	
Comments		
Duration, Parameter, and Sampling Frequency	not reported; BCF; not reported	
Concentration	Not Reported	
Analytical Method and Analytical Details	not reported; Not Reported;	
Rate Constant and Results per Recovery	Not Reported; not reported	
Statistics, Basis, and Calculation Basis	not reported; not reported; not reported	
Results Value and Results Details	1.37; Not Reported	
Metabolites, Reference, and Results Reference Substance	not reported; not reported; not reported	

Domain	Metric	Rating	Comments	EVALUATION
Domain 1: Test Substance				
	Metric 1: Test Substance Identity	High	The test substance was identified by name.	
	Metric 2: Test Substance Purity	N/A	The metric is not applicable to this study type.	
Domain 2: Test Design				
	Metric 3: Study Controls	Low	Concurrent control group details were not included in the secondary source.	
	Metric 4: Test Substance Stability	Low	The test substance stability, homogeneity, preparation or storage conditions were not reported in the secondary source.	
Domain 3: Test Conditions				

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		EVALUATION		
Domain	Metric	Rating	Comments	
Study Citation:	Wei, G. L., Li, D. Q., Zhuo, M. N., Liao, Y. S., Xie, Z. Y., Guo, T. L., Li, J. J., Zhang, S. Y., Liang, Z. Q. (2014). Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environmental Pollution 196C:29-46.			
OECD Harmonized Template:	Aquatic Bioconcentration			
HERO ID:	2534603			
	Metric 5:	Test Method Suitability	Low	The test method was not reported for the test substance. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
	Metric 6:	Testing Conditions	Low	Conditions were not reported. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
	Metric 7:	Testing Consistency	Low	Test conditions across samples or study groups were not reported in the secondary source.
	Metric 8:	System Type and Design	Low	System type and design were not reported in the secondary source.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Low	Test organism was not reported. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
	Metric 12:	Test Substance Purity	Low	Sampling method was not reported. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	Low	Organism health was not reported in the secondary source.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Low**

* Related References: secondary source; the original data source is unclear.

Study Citation:	Zhang, Y., Zheng, X., Wei, L., Sun, R., Guo, H., Liu, X., Liu, S., Li, Y., Mai, B. (2018). The distribution and accumulation of phosphate flame retardants (PFRs) in water environment. Science of the Total Environment 630:164-170.
OECD Harmonized Template:	Aquatic Bioconcentration
HERO ID:	5163356

		EXTRACTION	
Parameter	Data		
CASRN and Test Material	115-96-8; TCEP		
Confidentiality, Type, and Guideline	None; Experimental; other: Not reported; Bioaccumulation field study		
Solvent, Reactivity, Storage, Stability	NA; NA; Organism and filtered suspended solids samples stored at -20°C; NA		
Radiolabel, Source, State, Purity	NA; Organism, surface water, and sediment samples collected from the Peal River Delta in China; NA; NA		
Test Organism and Test Organism Details	Catfish (<i>Clarias batrachus</i>), tilapia (<i>Oreochromis mossambicus</i>), common carp (<i>Cyprinus carpio</i>), bream (<i>parabramis pekinensis</i>), white semiknife-carp (<i>Hemiculter leucisculus</i>), silver carp (<i>Hypophthalmichthys molitrix</i>); n=6, 5, 2, 3, 6, and 4		
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not applicable		
Media Type, TOC, and Salinity	natural water / sediment; Not reported; Not reported		
Dissolved Oxygen, Conductivity, and Hardness	Not reported; Not reported; Not reported		
Exposure Route, Elimination, and Nominal Measurements	Water; Not applicable; Measured: 92.1 ng/L (median), 44.9-327 ng/L (range) n= 11		
Test Type, Test Temperature, and Test Condition	field study; Not reported; Samples collected from 11 sites in the Peal River Delta, China		
Comments			
Duration, Parameter, and Sampling Frequency	Not reported; Not Reported; Once		
Concentration	44.9 - 327 ng/L		
Analytical Method and Analytical Details	GC-MS with electron impact ion source in SIM mode; analytes separated on DB-5MS capillary column; Filtered samples extracted by Oasis HLB cartridge eluted with ethyl acetate and DCM, concentrated with a nitrogen evaporator; fish muscle Soxhlet extracted by hexane/acetone, cleaned by gel permeation chromatography and Florisil cartridges;		
Rate Constant and Results per Recovery	Not applicable; 86.9 - 101% in spiked samples; recoveries of internal standards 93.0±9.4% (water), 98.0±8.9% (organism)		
Statistics, Basis, and Calculation Basis	Species specific and independent of lipid content; Organ, wet wt.; steady state		
Results Value and Results Details	log BAF=1.33±0.26; N.D. tilapia, N.D. - 3.18 ng/g ww catfish, 0.98 - 1.76 ng/g ww common carp, N.D. - 1.66 ng/g ww bream, N.D. silver carp, N.D. - 4.96 ng/g ww white semiknife-carp		
Metabolites, Reference, and Results Reference Substance	Not reported; Not reported; Not reported		

		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The chemical of interest was reported by name.
	Metric 2:	Test Substance Purity	High	The field samples sources were reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	A reference site was not reported, field or analytical blanks were not explicitly included.
	Metric 4:	Test Substance Stability	High	Sample storage and preparation were reported and appropriate.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: Zhang, Y., Zheng, X., Wei, L., Sun, R., Guo, H., Liu, X., Liu, S., Li, Y., Mai, B. (2018). The distribution and accumulation of phosphate flame retardants (PFRs) in water environment. Science of the Total Environment 630:164-170.				
OECD Harmonized Template: Aquatic Bioconcentration				
HERO ID: 5163356				
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the compound of interest.
	Metric 6:	Testing Conditions	Medium	No sample environmental conditions were reported, no water characteristics were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, processed and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	The species sampled were reported, no other details (mass, age) were provided, they may be included in supplemental information.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining bioaccumulation.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were appropriate, samples were collected during one campaign, water samples were collected from 11 sites but fish samples were collected from site 4 only.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	The study is only a preliminary study based on fish being collected from one sample site and the chemical of interest was detected in limited species.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	Differences in organism health were not reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	The analytical method was reported, extraction recovery was reported. Limits of detection were not reported, species specific BAF was not reported, environmental concentrations were reported as a range so independent calculation of BAF could not be conducted. Lipid normalized values or lipid content were not reported despite being measured.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Relationship between BAF and lipid content was reported but statistical analysis techniques were not specified.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The results reported were not species-specific and lack of detailed data reporting prevented independent BAF determination. Samples collected from one site only.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation: Zhang, Y., Zheng, X., Wei, L., Sun, R., Guo, H., Liu, X., Liu, S., Li, Y., Mai, B. (2018). The distribution and accumulation of phosphate flame retardants (PFRs) in water environment. Science of the Total Environment 630:164-170.

OECD Harmonized Template: Aquatic Bioconcentration

HERO ID: 5163356

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		Medium	

Study Citation:	Brandsma, S. H., Leonards, P., Leslie, H. A., de Boer, J. (2015). Tracing organophosphorus and brominated flame retardants and plasticizers in an estuarine food web. Science of the Total Environment 505:22-31.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	2935128

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Monitoring in an estuarine food web
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich Chemie B.V. (Zwijndrecht, the Netherlands); NR; pro-analysis quality or HPLC grade Notes: Monitoring study
Test Organism and Test Organism Details	other; Organisms sampled from Western Scheldt estuary, Netherlands:cockles, shore crabs and common shrimp, sculpin, plaice, goby, sole and Mysis (zooplankton), suspended matter/algae, jellyfish, and planktivorous fish, common tern eggs
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not reported
Moisture, TOC, and Test Conditions Comments	Not reported; Not reported; Not reported
Nominal Measured and Time Plateau	Not reported; Not reported
Duration, Parameter, and Sampling Frequency	Benthic and pelagic samples collected in September 2008; DT50; Not reported
Analytical Method and Analytical Details	HPLC-MS-ESI-MS-MS; lipid contents of benthic and pelagic samples analyzed using a modified Bligh and Dyer method; TOC determined in sediment and SPM using NEN-ISO method; LOD = 0.2 ng/g w/w; recovery in sediment 71% and sole lipids 73%;
Results Value, Result Type, and Results Standard Deviation	tentative TMF = 2.6 (Benthic food web n = 15); TMF in pelagic food web and total food web reported as 'not significant'; Not Reported; Not Reported
Calculation Basis and Basis	Reported steady state; other
Elimination, Metabolites, Kinetic Parameter, and Statistics	Not reported; Not reported; Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	The analytical standard source and purity were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	A concurrent control was not required for this study type.
	Metric 4: Test Substance Stability	High	The test substance preparation was reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Test conditions were monitored, reported, and appropriate for the method.
	Metric 7: Testing Consistency	High	Test conditions were consistent across the study groups
	Metric 8: System Type and Design	High	Equilibrium is assumed in this type of study.

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Domain	Metric	EVALUATION		Comments
		Rating		
Study Citation: Brandsma, S. H., Leonards, P., Leslie, H. A., de Boer, J. (2015). Tracing organophosphorus and brominated flame retardants and plasticizers in an estuarine food web. Science of the Total Environment 505:22-31.				
OECD Harmonized Template: Terrestrial Bioconcentration				
HERO ID: 2935128				
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Test organisms were reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the outcomes of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcomes of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Limited detail; however, supporting information (SI) may provide data.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistic methods were described and address the datasets.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Eulaers, I., Jaspers, V. L., Halley, D. J., Lepoint, G., Nygård, T., Pinxten, R., Covaci, A., Eens, M. (2014). Brominated and phosphorus flame retardants in White-tailed Eagle <i>Haliaeetus albicilla</i> nestlings: bioaccumulation and associations with dietary proxies ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^{34}\text{S}$). <i>Science of the Total Environment</i> 478:48-57.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	2542346

EXTRACTION

Parameter	Data
CASRN and Test Material	not reported; Not Reported
Confidentiality, EndPoint, Type, Guideline	No; bioaccumulation; Monitoring study; other: Monitoring study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	radiolabeled analytical standard used to spike field samples; NR; NR; NR Notes: NR
Test Organism and Test Organism Details	White-tailed Eagle nestlings; sex (8 male and 13 female); age (6 to 9 weeks of age); nestlings sampled for body feathers and blood; nests located in fjord, island/sound, and skerry/open coast in Ireland
Lipid Content, Test Temperature, pH, and Depuration Time	not reported; ambient; not applicable; not applicable
Moisture, TOC, and Test Conditions Comments	not applicable; not applicable; Not Reported
Nominal Measured and Time Plateau	Not Reported; not reported; field study assumed to be at steady state
Duration, Parameter, and Sampling Frequency	2011 monitoring study; bioaccumulation; not reported
Analytical Method and Analytical Details	Liquid/liquid extraction of plasma analytes; samples spiked with internal standards (1 ng/ μL TCEP-d12); analysis via GC with electron impact MS; radiolabeled analytical standard used for spiking; LOQ: 1.0 ng/g dw (feathers) 0.02 ng/g dw (plasma);
Results Value, Result Type, and Results Standard Deviation	$\beta_0 = -5.93$ and $\beta_x = 0.62$ based on model analysis; Body feathers: median = 110 (14-3000), plasma = <LOQ (0.00), statistical set was not possible for feather-plasma association due to non-detectable concentrations; based on stable isotope analysis TCEP was reported as one of the most bioaccumulated substances in the report (detected concentrations in feathers ranged from 14–3000 ng/g); not specified; β_0 (intercept for plasma/feather concentration association) and β_x ; not reported
Calculation Basis and Basis	steady state; associations between plasma and feather concentrations
Elimination, Metabolites, Kinetic Parameter, and Statistics	not reported; not reported; not reported; not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	The source of the samples were reported; radiolabeled standard used for analysis.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to this study.
	Metric 4: Test Substance Stability	High	The test substance stability, preparation, and storage conditions were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Low	The test method was suitable for the test substance with minor deviations; levels were not detected in one (plasma) of the media analyzed.

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Study Citation:	Eulaers, I., Jaspers, V. L., Halley, D. J., Lepoint, G., Nygård, T., Pinxten, R., Covaci, A., Eens, M. (2014). Brominated and phosphorus flame retardants in White-tailed Eagle <i>Haliaeetus albicilla</i> nestlings: bioaccumulation and associations with dietary proxies ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^{34}\text{S}$). <i>Science of the Total Environment</i> 478:48-57.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	2542346			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Site conditions were not reported.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study.
	Metric 8:	System Type and Design	High	Equilibrium is assumed in field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	There was incomplete reporting of outcome assessment methods and the results, β , were not clearly defined. Additional detail may be found in supplemental information; however, the document was not available.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Uninformative	Quantitative analysis results were not clearly defined.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study.

Overall Quality Determination**Uninformative**

Study Citation:	Fu, J., Fu, K., Gao, K., Li, H., Xue, Q., Chen, Y., Wang, L., Shi, J., Fu, J., Zhang, Q., Zhang, A., Jiang, G. (2020). Occurrence and trophic magnification of organophosphate esters in an Antarctic ecosystem: Insights into the shift from legacy to emerging pollutants. Journal of Hazardous Materials 396:122742.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	10296697

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, EndPoint, Type, Guideline	none; bioaccumulation; experimental; other: Monitoring study
Solvent, Reactivity, Storage, Stability	Not Reported; Not Reported; Not Reported; Not Reported
Radiolabel, Source, State, Purity	TCEP-d12; Cambridge Isotope Laboratories (Andover, MA, USA); Not Reported; 98%
Test Organism and Test Organism Details	six algae (<i>Halymenia floresia</i>), fifteen archeogastropoda (<i>Nacella concinna</i> , Agas), five neogastropoda (<i>Trophon geversianus</i> , Ngas), three fish (<i>Notothenia coriiceps</i>), thirteen feather samples of Cape petrel (<i>Daption capense</i>) and five feather samples of penguin (<i>Pygoscelis papua</i>) were collected from Fildes Peninsula, King George Island, and Ardley Island; collected from Antarctic samples (Fildes Peninsula, King George Island, and Ardley Island)
Lipid Content, Test Temperature, pH, and Depuration Time	lipid (%) Algae 3.38±0.87; Agas 8.15±0.32; Ngas 4.82±1.45; Fish 5.68±2.05; Cape petrel feathers 3.10±0.50; Penguin feathers 4.37±0.51; ambient; not specified; not specified
Moisture, TOC, and Test Conditions Comments	not specified; 0.96±0.35; field study
Nominal Measured and Time Plateau	measured; not specified
Duration, Parameter, and Sampling Frequency	Sampling between December 2012 and January 2013; Concentrations in biota: algae 0.52±0.14, Agas 0.28±0.05, Ngas 1.47±0.17, fish 3.95±1.89, Cape petrel feathers 2.09±0.43, penguin feathers 4.98±2.99.; not specified
Analytical Method and Analytical Details	LC-MS/MS; MDL: 0.20±0.010 ng/g (sediment), 0.0002 ng/g (algae), 0.0003 ng/g (chicken); % recovery 99±7.1% (sediment), 96±5.0% (algae), 104±5.8%(chicken);
Results Value, Result Type, and Results Standard Deviation	Average Biomagnification factor BMF in predator-prey relationships: 2.09 (range: Not determined to 2.74); trophic magnification factor TMF 5.20; BMF; TMF; not reported
Calculation Basis and Basis	steady state; log transformed lipid weight-based
Elimination, Metabolites, Kinetic Parameter, and Statistics	not reported; not reported; not reported; Statistical analyses performed; p<0.05

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	The test substance source and purity were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate analytical controls/blanks were included.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was appropriate.

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Study Citation:		Fu, J., Fu, K., Gao, K., Li, H., Xue, Q., Chen, Y., Wang, L., Shi, J., Fu, J., Zhang, Q., Zhang, A., Jiang, G. (2020). Occurrence and trophic magnification of organophosphate esters in an Antarctic ecosystem: Insights into the shift from legacy to emerging pollutants. Journal of Hazardous Materials 396:122742.		
OECD Harmonized Template:		Terrestrial Bioconcentration		
HERO ID:		10296697		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 6:	Testing Conditions	Medium	Limited detail regarding field conditions; however, omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study.
	Metric 8:	System Type and Design	High	Equilibrium is assumed in field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study.
	Metric 10:	Sampling Methods	High	Test organism information was reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Statistical techniques were reported in the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study.
Overall Quality Determination		High		

Study Citation:	Wan, W., Zhang, S., Huang, H., Wu, T. (2016). Occurrence and distribution of organophosphorus esters in soils and wheat plants in a plastic waste treatment area in China. Environmental Pollution 214(Elsevier):349-353.
OECD Harmonized Template:	Terrestrial Bioconcentration
HERO ID:	4182528

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, EndPoint, Type, Guideline	None; other; Experimental; other: Not reported; Field study bioaccumulation in wheat roots.
Solvent, Reactivity, Storage, Stability	NA; NR; Samples wrapped in aluminum foil, stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Xinle County and Dingzhou County in Hebei Province, China. 19 plastic waste treatment sites, 9 from nearby farmlands.; NA; Analytical grade Notes: Analytical standard obtained from Wellington Laboratories Inc. (Guelph, Ontario, Canada), analytical grade
Test Organism and Test Organism Details	Wheat plants; Whole plants collected in 4 replicates from 9 farmland sites
Lipid Content, Test Temperature, pH, and Depuration Time	Not reported; Not reported; Not reported; Not applicable
Moisture, TOC, and Test Conditions Comments	Not reported; Not reported; 0-15 cm soil samples (19 from plastic waste treatment sites, 9 from farmlands) and whole wheat plants were collected from Xinle County and Dingzhou County, China.
Nominal Measured and Time Plateau	7 - 436 ng/g dw; average: 92 ng/g dw; 90% detection frequency; Not applicable
Duration, Parameter, and Sampling Frequency	Not reported; Not Reported; June 2014
Analytical Method and Analytical Details	Agilent 7890 chromatography-mass spectrometry system, analytes separated on an HP-5MS column; LOD 6 - 200 pg/g (soil and plant); Soil and plant samples Soxhlet extracted with n-hexane/DCM and cleaned up according to method described in Moller et al. 2011; recovery 72.2-87.1% (soil), 75.6 - 90.0% (plant);
Results Value, Result Type, and Results Standard Deviation	0.125 - 0.375; RCF (root concentration factor); Not Reported
Calculation Basis and Basis	steady state; Root
Elimination, Metabolites, Kinetic Parameter, and Statistics	Not applicable; Not reported; Not applicable; ANOVA, $p < 0.05$; significant positive correlation between RCF and log Kow ($p < 0.001$) and between above ground tissues and soil concentration ($p < 0.001$), foliar uptake from air possible accumulation route; greater accumulation in above ground tissue

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The sample source was reported; the analytical standard source was reported and purity was reported qualitatively.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Analytical or field blanks were not explicitly included.
	Metric 4: Test Substance Stability	High	Sample storage was reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The field study method was appropriate.

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Study Citation:	Wan, W., Zhang, S., Huang, H., Wu, T. (2016). Occurrence and distribution of organophosphorus esters in soils and wheat plants in a plastic waste treatment area in China. Environmental Pollution 214(Elsevier):349-353.			
OECD Harmonized Template:	Terrestrial Bioconcentration			
HERO ID:	4182528			
	EVALUATION			
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	No environmental conditions or sample characteristics were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Organism reported by common name, scientific name or organism life stage, weight, etc. not reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining bioaccumulation.
	Metric 12:	Test Substance Purity	Medium	Sampling frequency was presumably one sampling campaign, sample preparation may be reported in greater detail elsewhere.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No significant sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	Medium	Organism health and attrition not reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, limits of detection and extraction recovery were reported, lipid content was not reported. Values estimated from figure.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method and compared to previous studies; however, few details on soil and plant characteristics were reported, lowering the reliability of this value.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	4170638

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Sorption and desorption by soil using batch equilibrium tests
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	No; Sigma-Aldrich Quimica S.L. (Madrid, Spain); NR; ≥95% Notes: TCEP
Sampling Frequency, Sampling Details, and Number of Replicates	Not specified; samples were centrifuged prior to analysis; 2
pH, Test Temperature, Buffer, and Test Details	7.6; 20±1°C; Not reported; sorption and desorption suspensions were shaken for 24 hrs (deemed appropriate time to reach equilibrium based on primary test)
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; OC 4.91%; Sand 33.2%, Silt 33.3%, Clay 33.5%; Not reported
Bulk Density and Matrix Details	Not reported; Surface soil (0-30 cm) collected in Pirineos, NE Spain
Media, Recovery, and Statistics	Milli-Q ultrapure water; Not reported; r squared = 0.99
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	blank included; Not reported; 57.2%
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Distribution coefficients Kd (mL g ⁻¹); 5.88; determined from the relationship between sorbed concentration and equilibrium concentration; 4.61±0.11
Partition Coefficient Type and Partition Coefficient Results	Koc (Kd coefficients normalized to the 100% OC content); Log Koc = 2.08
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Koc = 100Kd/% OC
Mass Balance	100% desorbed

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The test substance was identified clearly.
	Metric 2:	Test Substance Purity	High The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	Medium Concurrent controls were not explicitly included.

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Study Citation:		Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.		
OECD Harmonized Template:		Adsorption and Desorption		
HERO ID:		4170638		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 4:	Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	Reported values were within expected range.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

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Study Citation:	Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	4170638

Domain	Metric	EVALUATION Rating	Comments
Overall Quality Determination		High	

Study Citation:	Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	4170638

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Sorption and desorption by soil using batch equilibrium tests
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	No; Sigma-Aldrich Quimica S.L. (Madrid, Spain); NR; ≥95% Notes: TCEP
Sampling Frequency, Sampling Details, and Number of Replicates	Not specified; samples were centrifuged prior to analysis; 2
pH, Test Temperature, Buffer, and Test Details	7.9; 20±1°C; Not reported; sorption and desorption suspensions were shaken for 24 hrs (deemed appropriate time to reach equilibrium based on preliminary test)
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; OC 0.47%; Sand 76.9%, Silt 8.20%, Clay 14.9%; Not reported
Bulk Density and Matrix Details	Not reported; Surface soil (0-30 cm) collected in Castilla y Leon, NW Spain
Media, Recovery, and Statistics	Milli-Q ultrapure water; Not reported; r squared = 0.99
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	blank included; Not reported; 51.7%
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Distribution coefficients Kd (mL g ⁻¹); 1.57; determined from the relationship between sorbed concentration and equilibrium concentration; 0.89±0.02
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Koc (Kd coefficients normalized to the 100% OC content); Log Koc = 2.52
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Koc = 100Kd/% OC
Mass Balance	97.2% desorbed

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Concurrent controls were not explicitly included.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.			
OECD Harmonized Template: Adsorption and Desorption			
HERO ID: 4170638			
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High Testing conditions were reported.
	Metric 7:	Testing Consistency	High Test conditions were consistent.
	Metric 8:	System Type and Design	High Equilibrium was established.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High Reported values were within expected range.
	Metric 18:	QSAR Models	N/A The metric is not applicable to this study type.
Overall Quality Determination		High	

Study Citation:	Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	4170638

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Sorption and desorption by soil using batch equilibrium tests
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	No; Sigma-Aldrich Quimica S.L. (Madrid, Spain); NR; ≥95% Notes: TCEP
Sampling Frequency, Sampling Details, and Number of Replicates	Not specified; samples were centrifuged prior to analysis; 2
pH, Test Temperature, Buffer, and Test Details	7.3; 20±1°C; Not reported; sorption and desorption suspensions were shaken for 24 hrs (deemed appropriate time to reach equilibrium based on preliminary test)
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; OC 2.01%; Not reported
Bulk Density and Matrix Details	Not reported; sewage sludge amended surface soil (0-30 cm) which was Sand 76.9%, Silt 8.20%, Clay 14.9% collected in Castilla y Leon, NW Spain
Media, Recovery, and Statistics	Milli-Q ultrapure water; Not reported; r squared = 0.98
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	blank included; Not reported; 50.1%
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Distribution coefficients Kd (mL g ⁻¹); 3.79; determined from the relationship between sorbed concentration and equilibrium concentration; 2.61±0.08
Partition Coefficient Type and Partition Coefficient Results	Koc (Kd coefficients normalized to the 100% OC content); Log Koc = 2.28
Partition Coefficient Phase and Partition Coefficient Results	soil-water; Koc = 100Kd/% OC
Mass Balance	89.6% desorbed

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Concurrent controls were not explicitly included.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.

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Study Citation:	Cristale, J., Álvarez-Martín, A., Rodríguez-Cruz, S., Sánchez-Martín, M. J., Lacorte, S. (2017). Sorption and desorption of organophosphate esters with different hydrophobicity by soils. Environmental Science and Pollution Research 24(36):27870-27878.		
OECD Harmonized Template:	Adsorption and Desorption		
HERO ID:	4170638		
Domain	Metric	EVALUATION	
		Rating	Comments
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High Testing conditions were reported.
	Metric 7:	Testing Consistency	High Test conditions were consistent.
	Metric 8:	System Type and Design	High Equilibrium was established.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High The study reported the use of sampling methods that address the outcome of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High Sources of variability and uncertainty in the measurements, and statistical techniques were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High The target chemical concentrations, extraction efficiency, percent recovery, or mass balance were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High Reported values were within expected range.
	Metric 18:	QSAR Models	N/A The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Kim, U. J., Oh, J. K., Kannan, K. (2017). Occurrence, removal, and environmental emission of organophosphate flame retardants/plasticizers in a wastewater treatment plant in New York State. Environmental Science and Technology 51(14):7872-7880.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	3862000

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; other: Not reported; sorption distribution in WWTP
Solvent, Reactivity, Storage, Stability	NA; NR; Amber glass bottles, stored at 4°C; NR
Radiolabel, Source, State, Purity	NA; WWTP in Albany, New York; NA; NA
Sampling Frequency, Sampling Details, and Number of Replicates	Monthly, August 2013 - April 2014; daily April 27 - May 1, June 27 - June 28 2015; 24 h composite samples of influent, primary effluent, and final effluent, suspended particulate matter separated and retained; Not reported
pH, Test Temperature, Buffer, and Test Details	Not reported; Not reported; Not reported; Samples collected as part of WWTP efficiency and pollutant distribution study
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Not reported; Not reported
Bulk Density and Matrix Details	Not reported; Suspended particulate matter
Media, Recovery, and Statistics	Wastewater; 85.5-110% (water), 83.7-109% (SPM), 82.7-101 (solid); Not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NA; NA; NA
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; 5.68%
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Not Reported; Not Reported; Not Reported; Not Reported
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Not Reported; Not Reported
Partition Coefficient Phase and Partition Coefficient Results	suspended matter-water; Influent (aqueous, SPM): 1430 ng/L, 22.5 ng/g dry wt. Primary effluent (aqueous, SPM): 1090 ng/L, 20.4 ng/g dry wt. Secondary effluent (aqueous, SPM): 1100 ng/L, 17.9 ng/g dry wt.
Mass Balance	NA

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The sample source was reported generally.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Analytical and field blanks were included, results were assumed to be within an acceptable range.
	Metric 4:	Test Substance Stability	High	Sample storage and preparation were reported and appropriate.

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Domain	Metric	EVALUATION		Comments
		Rating		
Study Citation: Kim, U. J., Oh, J. K., Kannan, K. (2017). Occurrence, removal, and environmental emission of organophosphate flame retardants/plasticizers in a wastewater treatment plant in New York State. Environmental Science and Technology 51(14):7872-7880.				
OECD Harmonized Template: Adsorption and Desorption				
HERO ID: 3862000				
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No operational parameters and minimal operational stages for the WWTP were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Monitoring studies are assumed to be at equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	Medium	Sampling methods addressed the outcomes of interest, number of replicates not reported, seasonal variability was not addressed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Concentration ranges were reported, standard deviations or other statistical comparisons were not calculated.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate, extraction recovery and limits of detection were reported. Partition coefficient not determined, only percent sorption.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical or kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method; however, without WWTP operational information broader conclusions cannot be determined from the data.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Liu, Y., Song, N., Guo, R., Xu, H., Zhang, Q., Han, Z., Feng, M., Li, D., Zhang, S., Chen, J. (2018). Occurrence and partitioning behavior of organophosphate esters in surface water and sediment of a shallow Chinese freshwater lake (Taihu Lake): Implication for eco-toxicity risk. Chemosphere 202(Elsevier):255-263.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	8683711

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Field study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; J&K Chemical, Ltd. in St. Louis, MO, USA; NR; 97% Notes: high-performance liquid chromatography (HPLC) grade
Sampling Frequency, Sampling Details, and Number of Replicates	25 sites in Taihu Lake and its tributaries; Collected November 2016; 25
pH, Test Temperature, Buffer, and Test Details	Not reported; not applicable (field study); not applicable (field study); Not Reported
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Details in the supplemental file; Not reported
Bulk Density and Matrix Details	Not reported; Taihu Lake and its tributaries sediment (0-0.1m) samples
Media, Recovery, and Statistics	Taihu Lake and its tributaries surface water (0-1m) samples; Recovery rate of 66.4-97.7% was observed for water samples and 68.4-105.6% for sediment samples; details in the supplemental file; Pairwise correlations between the concentrations target substance in the surface water from Taihu Lake were reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; not applicable (field study); not applicable (field study)
Reference Substance, Reference Substance Results, and Percent Adsorption	radiolabeled internal standard from Sigma Aldrich (USA); Not Reported; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not reported; Not reported; Not reported; Not reported
Partition Coefficient Type and Partition Coefficient Results	Pseudo-partitioning coefficient (kd,s); 68 L/kg
Partition Coefficient Phase and Partition Coefficient Results	sediment-water; Partition coefficient calculated from mean sediment (ng/g dw)/surface water (ng/L) concentration = [(3.0 ng/g dw)/(44 ng/L)]
Mass Balance	Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The source or purity of the test substance was reported or the test substance identity and purity were verified by analytical means.

Domain 2: Test Design

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Liu, Y., Song, N., Guo, R., Xu, H., Zhang, Q., Han, Z., Feng, M., Li, D., Zhang, S., Chen, J. (2018). Occurrence and partitioning behavior of organophosphate esters in surface water and sediment of a shallow Chinese freshwater lake (Taihu Lake): Implication for eco-toxicity risk. Chemosphere 202(Elsevier):255-263.			
OECD Harmonized Template: Adsorption and Desorption			
HERO ID: 8683711			
Domain 3: Test Conditions			
	Metric 3:	Study Controls	High An internal standard was included.
	Metric 4:	Test Substance Stability	High The test substance preparation was reported.
	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium There were reported deviations or omissions in testing conditions; however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7:	Testing Consistency	High Test conditions were consistent across samples or study groups.
	Metric 8:	System Type and Design	Medium Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to the study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium Minor limitations were identified in sampling methods of the outcomes of interest were reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High Sources of variability and uncertainty in the measurements, and statistical techniques and between study groups (if applicable) were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	Medium The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High Statistical methods or kinetic calculations were clearly described and address the dataset.
Domain 8: Other			

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Study Citation:	Liu, Y., Song, N., Guo, R., Xu, H., Zhang, Q., Han, Z., Feng, M., Li, D., Zhang, S., Chen, J. (2018). Occurrence and partitioning behavior of organophosphate esters in surface water and sediment of a shallow Chinese freshwater lake (Taihu Lake): Implication for eco-toxicity risk. Chemosphere 202(Elsevier):255-263.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	8683711

Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 17: Verification or Plausibility of Results	High		The study results were reasonable.
	Metric 18: QSAR Models	N/A		The metric is not applicable to the study type.

Overall Quality Determination

High

Study Citation:	Picó, Y., Campo, J., Alfathan, A. H., El-Sheikh, M. A., Barceló, D. (2021). A reconnaissance study of pharmaceuticals, pesticides, perfluoroalkyl substances and organophosphorus flame retardants in the aquatic environment, wild plants and vegetables of two Saudi Arabia urban areas: Environmental and human health risk assessment. Science of the Total Environment 776:145843.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	7538306

		EXTRACTION
Parameter	Data	
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate	
Confidentiality, Type, Guideline	No; Field study, partition coefficient; Not Reported	
Solvent, Reactivity, Storage, Stability	NA; NR; Water samples filtered and stored at -20 deg C, sediment sample storage NR.; NR	
Radiolabel, Source, State, Purity	NA; Urban field samples in Saudi Arabia; NA; NA	
Sampling Frequency, Sampling Details, and Number of Replicates	Once, February 2019; Surface 30-40 cm water samples collected in the middle of rivers and channels, sediment samples collected at same point with a Van Veen grab sampler.; 11 samples for water and 11 samples for sediment.	
pH, Test Temperature, Buffer, and Test Details	NR; NR; NA; Field study, samples collected from sites in Al-Jubail, and sites in Riyadh South, Saudi Arabia	
Matrix, Clay Silts and Organic Carbon, and CEC	other; NR; NR	
Bulk Density and Matrix Details	NR; Sediment from urban sites.	
Media, Recovery, and Statistics	Water and sediment; 95% (water), 85% (sediment); No significant difference (p > 0.05) between the two areas for the total contaminant detected	
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NR; Field study; Field study	
Reference Substance, Reference Substance Results, and Percent Adsorption	NR; NR; NR	
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Not Reported; Not Reported; Not Reported; Not Reported	
Partition Coefficient Type and Partition Coefficient Results	Kd; Kd (calculated by reviewer) = 1070 L/kg	
Partition Coefficient Phase and Partition Coefficient Results	Sediment-water; Mean water: 9.93 ng/L Mean sediment: 10.6 ng/g d.w.	
Mass Balance	NA	

		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance	Metric 1:	Test Substance Identity	High	The test substance was identified by acronym, but the full name was confirmed in the supplemental information.
	Metric 2:	Test Substance Purity	N/A	Not applicable for field studies.
Domain 2: Test Design	Metric 3:	Study Controls	N/A	Not applicable for field studies.

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Study Citation:	Picó, Y., Campo, J., Alfarhan, A. H., El-Sheikh, M. A., Barceló, D. (2021). A reconnaissance study of pharmaceuticals, pesticides, perfluoroalkyl substances and organophosphorus flame retardants in the aquatic environment, wild plants and vegetables of two Saudi Arabia urban areas: Environmental and human health risk assessment. Science of the Total Environment 776:145843.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	7538306			
		EVALUATION		
Domain	Metric		Rating	Comments
	Metric 4:	Test Substance Stability	Medium	Sample storage was reported for aqueous samples but not for sediment samples; stability was not confirmed.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	The authors did not determine partition coefficients.
	Metric 6:	Testing Conditions	Medium	No sample or environmental characteristics were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, extracted, and analyzed consistently.
	Metric 8:	System Type and Design	N/A	Not applicable, field studies assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining sediment-water partition coefficients.
	Metric 12:	Test Substance Purity	Medium	The sampling methods were appropriate, frequency may not reflect temporal variation.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variability and uncertainty were not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; limits of detection and extraction efficiency were reported in the supplemental information. Sample concentrations were reported as a mean of both areas only, site specific data was not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were applied appropriately to determine significant difference.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The authors did not determine partition coefficients so therefore did not compare them to previously reported values. The lack of reported organic content reduces the ability to determine plausibility of the results.
	Metric 18:	QSAR Models	N/A	Not applicable.

Overall Quality Determination**Medium**

Study Citation:	Wang, X., Zhu, L., Zhong, W., Yang, L. (2018). Partition and source identification of organophosphate esters in the water and sediment of Taihu Lake, China. <i>Journal of Hazardous Materials</i> 360:43-50.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5469212

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(Chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Koc calculated from sediment and water sample pairs.
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	TCEP-d12 was used as a recovery and internal standard (Toronto Research Chemicals Inc., Canada); AccuStandard (USA); NR; NR
Sampling Frequency, Sampling Details, and Number of Replicates	One time sampling at 29 locations in Taihu Lake.; Water, suspended particulate matter (SPM), and sediment samples were collected.; 1
pH, Test Temperature, Buffer, and Test Details	Not reported; Not reported; Not reported; SPM and sediment samples were extracted with ACN. Water samples were extracted with SPE cartridge (ENVI-C18, 6mL, 500mg; Supelco, USA).
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Total organic carbon was measured and used in Koc calculation but not reported.; Not reported
Bulk Density and Matrix Details	Not reported; Not reported
Media, Recovery, and Statistics	Not Reported; Water: 72.3-138%; SPM: 79.4-115%; sediment: 74.4-124%; Not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not Reported; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Not reported; Not reported; Not reported; $kd = (\text{Conc. Solids} / \text{Conc. Water} \times 1000)$
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Koc ($kd \times 100 / Foc$); $\text{Log Kd water-SPM} = 2.31$; $\text{Log Kd water-sediment} = 1.14$; $\text{Log Koc water-sediment} = 3.23$
Partition Coefficient Phase and Partition Coefficient Results	water - sediment; Not Reported
Mass Balance	Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was measured in field samples.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate method blanks and solvent blanks were used.
	Metric 4: Test Substance Stability	High	The test substance preparation, storage, and homogeneity were reported and appropriate.

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Study Citation:	Wang, X., Zhu, L., Zhong, W., Yang, L. (2018). Partition and source identification of organophosphate esters in the water and sediment of Taihu Lake, China. Journal of Hazardous Materials 360:43-50.		
OECD Harmonized Template:	Adsorption and Desorption		
HERO ID:	5469212		
Domain	Metric	EVALUATION	
		Rating	Comments
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High The testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High The testing conditions were consistent across the sample groups.
	Metric 8:	System Type and Design	High The system type (field sampling) was appropriate.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to the study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High The sampling methods were described and appropriate.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High Uncertainty in the Koc value was reported and appropriate.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High The analytical method was appropriate for detection and quantification of the target substance and percent recoveries were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High Statistical analysis was reported and appropriate.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High The study results are consistent with the chemical properties.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.

Overall Quality Determination**High**

Study Citation:	Wei, G. L., Li, D. Q., Zhuo, M. N., Liao, Y. S., Xie, Z. Y., Guo, T. L., Li, J. J., Zhang, S. Y., Liang, Z. Q. (2014). Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environmental Pollution 196C:29-46.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	2534603

Parameter	Data	EXTRACTION
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate	
Confidentiality, Type, Guideline	None; experimental; other: not specified	
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR	
Radiolabel, Source, State, Purity	None; NR; NR; NR Notes: TCEP	
Sampling Frequency, Sampling Details, and Number of Replicates	not reported; Not Reported; not reported	
pH, Test Temperature, Buffer, and Test Details	not reported; not reported; not reported; Not Reported	
Matrix, Clay Silts and Organic Carbon, and CEC	other; not reported; not reported	
Bulk Density and Matrix Details	not reported; not reported	
Media, Recovery, and Statistics	not reported; not reported; not reported	
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	not reported; Not Reported; Not Reported	
Reference Substance, Reference Substance Results, and Percent Adsorption	not reported; Not Reported; not reported	
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	not reported; Not Reported; Not Reported; not reported	
Desorption Type		
Partition Coefficient Type and Partition Coefficient Results	log K _{oc} ; 2.48	
Partition Coefficient Phase and Partition Coefficient Results	not reported; Not Reported	
Mass Balance	not reported	

Domain	Metric	Rating	Comments	EVALUATION
Domain 1: Test Substance				
	Metric 1: Test Substance Identity	High	The test substance was identified by name.	
	Metric 2: Test Substance Purity	Low	Details regarding this metric were not reported in the secondary source.	
Domain 2: Test Design				
	Metric 3: Study Controls	Low	Details regarding this metric were not reported in the secondary source.	
	Metric 4: Test Substance Stability	Low	Details regarding this metric were not reported in the secondary source.	
Domain 3: Test Conditions				

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Study Citation:		Wei, G. L., Li, D. Q., Zhuo, M. N., Liao, Y. S., Xie, Z. Y., Guo, T. L., Li, J. J., Zhang, S. Y., Liang, Z. Q. (2014). Organophosphorus flame retardants and plasticizers: Sources, occurrence, toxicity and human exposure. Environmental Pollution 196C:29-46.		
OECD Harmonized Template:		Adsorption and Desorption		
HERO ID:		2534603		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5: Test Method Suitability	Low	The test method was not reported for the test substance. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.	
	Metric 6: Testing Conditions	Low	Conditions were not reported. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.	
	Metric 7: Testing Consistency	Low	Details regarding this metric were not reported in the secondary source.	
	Metric 8: System Type and Design	Low	Details regarding this metric were not reported in the secondary source.	
Domain 4: Test Organisms				
	Metric 9: Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.	
	Metric 10: Sampling Methods	N/A	The metric is not applicable to this study type.	
Domain 5: Outcome Assessment				
	Metric 11: Test Substance Identity	Low	This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.	
	Metric 12: Test Substance Purity	Low	Sampling method was not reported. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.	
Domain 6: Confounding/Variable Control				
	Metric 13: Confounding Variables	N/A	The metric is not applicable to this study type.	
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.	
Domain 7: Data Presentation and Analysis				
	Metric 15: Data Reporting	Low	This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.	
	Metric 16: Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.	
Domain 8: Other				
	Metric 17: Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible. This is a secondary source and it is not clear as to the origin of the results. Data may be available in document supplementary data.	
	Metric 18: QSAR Models	N/A	The metric is not applicable to this study type.	

Overall Quality Determination**Low**

* Related References: secondary source; the original data source is unclear.

Study Citation:	Xing, L., Zhang, Q., Sun, X., Zhu, H., Zhang, S., Xu, H. (2018). Occurrence, distribution and risk assessment of organophosphate esters in surface water and sediment from a shallow freshwater Lake, China. Science of the Total Environment 636:632-640.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5469238

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Field study, distribution coefficient in lake samples; Not Reported
Solvent, Reactivity, Storage, Stability	NA; NA; NA; NA
Radiolabel, Source, State, Purity	NA; NA; NA; NA Notes: Internal standards purchased from J&K Chemical, Ltd. (St.Louis, MO, USA)
Sampling Frequency, Sampling Details, and Number of Replicates	Once; 14 surface water samples (depth 0-1 m) and 6 sediment samples (depth 0-0.1 m) collected from Luoma Lake, November 2016; NR
pH, Test Temperature, Buffer, and Test Details	NR; NR; NA; Field study, samples collected from Luoma Lake at the estuary, center, and lake outlet.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; NR; NR
Bulk Density and Matrix Details	NR; Not Reported
Media, Recovery, and Statistics	Not Reported; 88-130% (water), 77-111% (sediment); RSD under 10%
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	NR; Not Reported; Not Reported
Reference Substance, Reference Substance Results, and Percent Adsorption	NA; NA; NR
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	Not Reported; Not Reported; Not Reported; Not Reported
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	Kd; Kd = 5.4 L/kg
Partition Coefficient Phase and Partition Coefficient Results	Water-sediment; Average water concentration: 69.9 ng/L; average sediment concentration: 0.38 ng/gKd = [sediment]/[water]
Mass Balance	Not Reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	N/A	Not applicable for field studies.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	Not applicable for field studies.
	Metric 4:	Test Substance Stability	N/A	Not applicable for field studies.
Domain 3: Test Conditions				

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Study Citation:		Xing, L., Zhang, Q., Sun, X., Zhu, H., Zhang, S., Xu, H. (2018). Occurrence, distribution and risk assessment of organophosphate esters in surface water and sediment from a shallow freshwater Lake, China. Science of the Total Environment 636:632-640.		
OECD Harmonized Template:		Adsorption and Desorption		
HERO ID:		5469238		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	High	The field study method was appropriate and the appropriate phases were sampled.
	Metric 6:	Testing Conditions	Low	No field or sample characteristics, such as sediment organic carbon content, were reported.
	Metric 7:	Testing Consistency	High	Sampling was consistent across sites.
	Metric 8:	System Type and Design	N/A	Field studies assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining the partition coefficient.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were appropriate, sampling frequency may not have reflected possible seasonal/temporal aqueous concentrations.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Uncertainty and variability was not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, and extraction efficiency and limits of detection were reported. Summary of the aqueous and sediment concentrations were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not performed.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Without organic carbon content of the sediments or other characteristics, the plausibility cannot be verified. The results were notably lower than previous studies.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination		Medium		

Study Citation:	Zhang, L., Lu, L., Zhu, W., Yang, B., Lu, D., Dan, S. F., Zhang, S. (2021). Organophosphorus flame retardants (OPFRs) in the seawater and sediments of the Qinzhou Bay, Northern Beibu Gulf: Occurrence, distribution, and ecological risks. Marine Pollution Bulletin 168:112368.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	7537927

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Monitoring study; other: Nonguideline: Surface water and sediment concentrations
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Standards from Dr. Ehrenstorfer GmbH (Oakville, ON, Canada); NR; NR Notes: monitoring study
Sampling Frequency, Sampling Details, and Number of Replicates	not reported; Qinzhou Bay surface seawater and sediment (0-5 cm) samples were collected from 18 sites, sediment core (74 cm) retrieved from one site in June 2020; sites were mainly estuarine areas, maricultural areas, adjacent industrial or harbor areas, and scenic or suburb areas; samples stored cold and analyzed within 24hrs.; triplicate samples collected from each site and mixed together in amber glass bottles
pH, Test Temperature, Buffer, and Test Details	not reported; not reported; not reported; not reported
Matrix, Clay Silts and Organic Carbon, and CEC	other; not reported; not reported
Bulk Density and Matrix Details	not reported; natural water
Media, Recovery, and Statistics	sediment; recoveries ranged from 60.5-121.4%; not reported
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	not reported; not reported; not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	not reported; not reported; not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption	not reported; not reported; Mean concentration (and range) in the surface seawater and sediment = 144.8 ng/L (30.9-370.3 ng/L) and 1.0 ng/g dw (nd-14.5 ng/g dw); not reported
Desorption Type	
Partition Coefficient Type and Partition Coefficient Results	not reported; not reported
Partition Coefficient Phase and Partition Coefficient Results	not reported; not reported
Mass Balance	not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	Monitoring study; analytical standard reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to this study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this study type.

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Study Citation:	Zhang, L., Lu, L., Zhu, W., Yang, B., Lu, D., Dan, S. F., Zhang, S. (2021). Organophosphorus flame retardants (OPFRs) in the seawater and sediments of the Qinzhou Bay, Northern Beibu Gulf: Occurrence, distribution, and ecological risks. Marine Pollution Bulletin 168:112368.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	7537927			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	N/A	The metric is not applicable to this study type.
	Metric 6:	Testing Conditions	Low	Details cited to supplemental document which was not readily available.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study type.
	Metric 8:	System Type and Design	High	Equilibrium is assumed in field studies.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	The assessment methodology did not address or report the outcome of interest; data presented does not allow for precise calculation of partitioning.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Details were reported in supporting documents which was not readily available.
	Metric 16:	Statistical Methods and Kinetic Calculations	Low	Statistical analysis was not described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Uninformative	The intended outcome of interest was not reported.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		Uninformative		

Study Citation:	Zhang, W., Guo, C., Lv, J., Li, X., Xu, J. (2021). Organophosphate esters in sediment from Taihu Lake, China: Bridging the gap between riverine sources and lake sinks. <i>Frontiers of Environmental Science & Engineering</i> 16:30.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	8683717

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: Sediment-water partition coefficients based on surface sediment and lake sediment core samples from Taihu Lake in China
Solvent, Reactivity, Storage, Stability	NR; NR; Samples stored in in stainless steel boxes at 4°C; Not Reported
Radiolabel, Source, State, Purity	Analytical standard: TCEP-d12 from AccuStandard (USA); Field samples from Taihu Lake in China; NR; NR Notes: TCEP
Sampling Frequency, Sampling Details, and Number of Replicates	Field sampling in June 2019; Sediment (0–10 cm) samples collected and spiked with 100 ng of TCEP-d12; 30 total samples collected
pH, Test Temperature, Buffer, and Test Details	Not reported; ambient; Not reported; Concentrations in nearby river sediments: range = 2.12 - 48.24, median = 8.32 mean = 14.04 ng/g and in lake sediments: 4.15 - 58.01, median = 10.18, mean = 14.90
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Not reported; Not reported
Bulk Density and Matrix Details	Not reported; Lake sediment
Media, Recovery, and Statistics	Lake water; recovery = 90.84±6.09% and for the analytical standard = 64.25±17.21%; statistical analyses were performed: SPSS 22.0 and Origin Pro 2016
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Not reported; Not reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Field and method blanks included; TPhP not detected in blanks; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	log pseudo-partitioning coefficient (Kd,s); Mean = 2.11 L/kg (range 1-2.56, median 1.94); based on 25 values; Kd,s is equal to the ratio of concentration in sediments (Cs, ng/g) to concentration in water (Cw, ng/L); p value of concentration between river and lake = 0.118; Not reported
Partition Coefficient Type and Partition Coefficient Results	Log Koc; Mean = 3.32 L/kg (range 2.50-4.06, median 3.30)
Partition Coefficient Phase and Partition Coefficient Results	sediment-water; based on 25 values; Spearman correlation between kd,s and foc = 0.490; correlation was considered significant at the 0.05 level (2-tailed)
Mass Balance	Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	Analytical standard source reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Method and field blanks included.
	Metric 4: Test Substance Stability	High	Field sample preparation and storage conditions reported.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Zhang, W., Guo, C., Lv, J., Li, X., Xu, J. (2021). Organophosphate esters in sediment from Taihu Lake, China: Bridging the gap between riverine sources and lake sinks. <i>Frontiers of Environmental Science & Engineering</i> 16:30.			
OECD Harmonized Template: Adsorption and Desorption			
HERO ID: 8683717			
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Low	Field conditions not reported.
	Metric 7: Testing Consistency	N/A	This metric is not applicable to this type of study.
	Metric 8: System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms			
	Metric 9: Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10: Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment			
	Metric 11: Test Substance Identity	High	The outcome assessment methodology reported the intended outcomes of interest. Details were reported in the supporting information.
	Metric 12: Test Substance Purity	Medium	Sampling was appropriate; however, limited details were provided.
Domain 6: Confounding/Variable Control			
	Metric 13: Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14: Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis			
	Metric 15: Data Reporting	High	Detail and results reported in supporting information document.
	Metric 16: Statistical Methods and Kinetic Calculations	High	Methods were reported and appropriate. Details were reported in the supporting information.
Domain 8: Other			
	Metric 17: Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18: QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High	

Study Citation:	Zhang, Y., Zheng, X., Wei, L., Sun, R., Guo, H., Liu, X., Liu, S., Li, Y., Mai, B. (2018). The distribution and accumulation of phosphate flame retardants (PFRs) in water environment. Science of the Total Environment 630:164-170.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5163356

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; calculation; other: Not reported; field study in river delta
Solvent, Reactivity, Storage, Stability	NA; NA; Organism and filtered suspended solids samples stored at -20°C; NA
Radiolabel, Source, State, Purity	NA; Organism, surface water, and sediment samples collected from the Peal River Delta in China; NA; NA
Sampling Frequency, Sampling Details, and Number of Replicates	Once; surface water samples collected from 11 sites in the Pearl River Delta in China; Not reported
pH, Test Temperature, Buffer, and Test Details	Not reported; Not reported; Not reported; Field study in the Pearl River Delta in which surface water samples were collected, filtered retaining filtrated suspended matter, and analyzed to calculate the distribution of the chemical of interest.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; Not reported; Not reported
Bulk Density and Matrix Details	Not reported; Pearl River Delta suspended matter
Media, Recovery, and Statistics	Pearl River Delta water; 86.9 - 101% in spiked samples; recoveries of internal standards 93.0±9.4% (water), 85.2±8.8% (SPM); Spearman correlation analysis: Correlation between log Kp and OC%, R = - 0.608, p < 0.05, Pearson correlation: no significant correlation between log Koc and EPI Suite predicted log Koc
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; NA; NA
Reference Substance, Reference Substance Results, and Percent Adsorption	Not reported; Not reported; Not reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	log Koc; 3.46±0.48; Estimated from log Kp values normalized by OC%Surface water median (range): 92.1 ng/L (44.9 - 327 ng/L) n = 11Suspended particulate matter median (range): 10.7 ng/g dw (3.34 - 88.9 ng/g dw) n= 11; Not reported
Partition Coefficient Type and Partition Coefficient Results	Not Reported; Not Reported
Partition Coefficient Phase and Partition Coefficient Results	suspended matter-water; Not Reported
Mass Balance	NA

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	Medium	The source of the field samples was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Analytical and field blanks were not explicitly included.

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Study Citation:		Zhang, Y., Zheng, X., Wei, L., Sun, R., Guo, H., Liu, X., Liu, S., Li, Y., Mai, B. (2018). The distribution and accumulation of phosphate flame retardants (PFRs) in water environment. Science of the Total Environment 630:164-170.		
OECD Harmonized Template:		Adsorption and Desorption		
HERO ID:		5163356		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 4:	Test Substance Stability	High	Sample storage and preparation was reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The field study was suitable for the chemical of interest.
	Metric 6:	Testing Conditions	Medium	No sample characteristics were reported, organic carbon content was determined but not reported. Details may be included in supplemental information.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was appropriate for determining partitioning.
	Metric 12:	Test Substance Purity	Medium	Samples were collected from 11 sites during one sampling campaign; variation at sites cannot be accounted for. Samples were collected for appropriate media.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No other significant sources of uncertainty were identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate. Recoveries were reported but not limits of detection. Kp values were not reported but may be included in supplemental material.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method but each site was sampled only once, these results are best considered to be preliminary values.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Zheng, C., Feng, S., Liu, P., Fries, E., Wang, Q., Shen, Z., Liu, H., Zhang, T. (2016). Sorption of organophosphate flame retardants on pahoee peat soil. CLEAN - Soil, Air, Water 44(9):1163-1173.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5469327

		EXTRACTION	
Parameter	Data		
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate		
Confidentiality, Type, Guideline	None; Experimental; other: None indicated		
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR		
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (Shanghai, China); NR; 97%		
Sampling Frequency, Sampling Details, and Number of Replicates	20 to 1440 min; 15 mL of TCEP of working solution added to Pahoee peat soil (15:1), sealed by aluminum foil and shaken at 300 rpm and different temperatures in the dark.; 6, mean values reported		
pH, Test Temperature, Buffer, and Test Details	Not reported; 10°C; Not reported; 185 mg/L of TCEP added to Pahoee peat soil II (OC 0.4316 and OM 0.7589), along with controls, and blanks, and extracted and analyzed over 20 to 1440 min at 10°C, 25°C, and 40°C.		
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; OC = 0.4315; OM= 0.7598; Not reported		
Bulk Density and Matrix Details	Not reported; Elemental composition of peat (w/w %): [C] 51%; [H] 3.53%; [O] 43.32%; [H2O] 9.3%; ash 0.90%; [N] 2.34; [S] 0.76%; [P] <0.01%.		
Media, Recovery, and Statistics	Pahoee peat soil II (air-dried and γ -irradiated with Mrad-60-Co to kill microbes). Stored in dark at 4°C.; Not reported; R ² for Langmuir model fit: 0.9909		
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Langmuir sorption equilibrium constant related to the energy of sorption (L/ μ g) = 0.002; Not Reported		
Reference Substance, Reference Substance Results, and Percent Adsorption	Triisopropyl phosphate (TiPP), final concentration 116 mg/L; Not Reported; Not Reported		
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Sorption capacity = q_m (μ g/g); 15.084; The Langmuir isotherm fit the experimental data better than the Freundlich and Dubinin-Radushkevich models.; Not Reported		
Partition Coefficient Type and Partition Coefficient Results	Not Reported; Not Reported		
Partition Coefficient Phase and Partition Coefficient Results	Not Reported; Not Reported		
Mass Balance	Not reported		

		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	The study used appropriate controls.
	Metric 4:	Test Substance Stability	High	The test substance preparation and storage conditions were reported.

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Study Citation:	Zheng, C., Feng, S., Liu, P., Fries, E., Wang, Q., Shen, Z., Liu, H., Zhang, T. (2016). Sorption of organophosphate flame retardants on pahoee peat soil. CLEAN - Soil, Air, Water 44(9):1163-1173.		
OECD Harmonized Template:	Adsorption and Desorption		
HERO ID:	5469327		
Domain	Metric	EVALUATION Rating	Comments
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High Relevant testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High Testing conditions that were changed across the study groups were reported and intentional.
	Metric 8:	System Type and Design	High Equilibrium was established.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to this study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High The sampling methods and frequency were reported and appropriate.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High Relative standard deviations were reported and acceptable for the concentration determinations. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High The data reporting was appropriate and the analytical method was suitable for the study type.
	Metric 16:	Statistical Methods and Kinetic Calculations	High The statistical analysis was clearly reported and appropriate.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	High The study results are reasonable.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.
Overall Quality Determination		High	

Study Citation:	Zheng, C., Feng, S., Liu, P., Fries, E., Wang, Q., Shen, Z., Liu, H., Zhang, T. (2016). Sorption of organophosphate flame retardants on pahoee peat soil. CLEAN - Soil, Air, Water 44(9):1163-1173.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5469327

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: None indicated
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (Shanghai, China); NR; 97%
Sampling Frequency, Sampling Details, and Number of Replicates	20 to 1440 min; 185 mg/L of TCEP working solution added to Pahoee peat soil II (OC 0.4316 and OM 0.7589), along with controls, and blanks, and extracted an analyzed over 20 to 1440 min at 10°C, 25°C, and 40°C.; 6, mean values reported
pH, Test Temperature, Buffer, and Test Details	Not reported; 25°C; Not reported; 185 mg/L of TCEP added to Pahoee peat soil II (OC 0.4316 and OM 0.7589), along with controls, and blanks, and extracted an analyzed over 20 to 1440 min at 10°C, 25°C, and 40°C.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; OC = 0.4315, OM= 0.7598; Not reported
Bulk Density and Matrix Details	Not reported; Elemental composition of peat (w/w %): [C] 51%; [H] 3.53%; [O] 43.32%; [H2O] 9.3%; ash 0.90%; [N] 2.34; [S] 0.76%; [P] <0.01%.
Media, Recovery, and Statistics	Pahoee peat soil II (air-dried and γ -irradiated with Mrad-60-Co to kill microbes). Stored in dark at 4°C.; Not reported; R ² for Langmuir model fit: 0.9726
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not reported; Langmuir sorption equilibrium constant related to the energy of sorption (L/ μ g) = 0.004; Not Reported
Reference Substance, Reference Substance Results, and Percent Adsorption	TiPP, final concentration 116 mg/L; Not Reported; Not Reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Sorption capacity = q _m (μ g/g); 2.579; The Langmuir isotherm fit the experimental data better than the Freundlich and Dubinin-Radushkevich models.; Not Reported
Partition Coefficient Type and Partition Coefficient Results	Not Reported; Not Reported
Partition Coefficient Phase and Partition Coefficient Results	Not Reported; Not Reported
Mass Balance	Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3: Study Controls	High	The study used appropriate controls.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported.
Domain 3: Test Conditions			

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Study Citation:	Zheng, C., Feng, S., Liu, P., Fries, E., Wang, Q., Shen, Z., Liu, H., Zhang, T. (2016). Sorption of organophosphate flame retardants on pahoee peat soil. CLEAN - Soil, Air, Water 44(9):1163-1173.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5469327			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Relevant testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	Testing conditions that were changed across the study groups were reported and intentional.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods and frequency were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Relative standard deviations were reported and acceptable for the concentration determinations. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The data reporting was appropriate and the analytical method was suitable for the study type.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was clearly reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**High**

Study Citation:	Zheng, C., Feng, S., Liu, P., Fries, E., Wang, Q., Shen, Z., Liu, H., Zhang, T. (2016). Sorption of organophosphate flame retardants on pahoee peat soil. CLEAN - Soil, Air, Water 44(9):1163-1173.
OECD Harmonized Template:	Adsorption and Desorption
HERO ID:	5469327

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; other: None indicated
Solvent, Reactivity, Storage, Stability	Methanol; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Sigma-Aldrich (Shanghai, China); NR; 97%
Sampling Frequency, Sampling Details, and Number of Replicates	20 to 1440 min; 15 mL of TCEP working solution added to Pahoee peat soil (15:1), sealed by aluminum foil and shaken at 300 rpm and different temperatures in the dark.; 6, mean values reported
pH, Test Temperature, Buffer, and Test Details	Not reported; 40°C; Not reported; 185 mg/L of TCEP added to Pahoee peat soil II (OC 0.4316 and OM 0.7589), along with controls, and blanks, and extracted and analyzed over 20 to 1440 min at 10°C, 25°C, and 40°C.
Matrix, Clay Silts and Organic Carbon, and CEC	Not Reported; OC = 0.4315, OM= 0.7598; Not reported
Bulk Density and Matrix Details	Not reported; Elemental composition of peat (w/w %): [C] 51%; [H] 3.53%; [O] 43.32%; [H2O] 9.3%; ash 0.90%; [N] 2.34; [S] 0.76%; [P] <0.01%.
Media, Recovery, and Statistics	Pahoee peat soil II (air-dried and γ -irradiated with Mrad-60-Co to kill microbes). Stored in dark at 4°C.; Not reported; R ² for Langmuir model fit: 0.9948
Transformation Products, Equilibrium Adsorption Details, and Equilibrium Desorption Details	Not Reported; Langmuir sorption equilibrium constant related to the energy of sorption (L/ μ g) = 0.003; Not Reported
Reference Substance, Reference Substance Results, and Percent Adsorption	Triisopropyl phosphate (TiPP), final concentration 116 mg/L; Not Reported; Not Reported
Adsorption Coefficient Type, Adsorption Coefficient Results, Adsorption Coefficient Results Comments, and Adsorption Desorption Type	Sorption capacity = q _m (μ g/g); 1.990; The Langmuir isotherm fit the experimental data better than the Freundlich and Dubinin-Radushkevich models.; Not Reported
Partition Coefficient Type and Partition Coefficient Results	Not Reported; Not Reported
Partition Coefficient Phase and Partition Coefficient Results	Not Reported; Not Reported
Mass Balance	Not reported

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance purity was reported and appropriate.
Domain 2: Test Design			
	Metric 3: Study Controls	High	The study used appropriate controls.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported.
Domain 3: Test Conditions			

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Study Citation:	Zheng, C., Feng, S., Liu, P., Fries, E., Wang, Q., Shen, Z., Liu, H., Zhang, T. (2016). Sorption of organophosphate flame retardants on pahoee peat soil. CLEAN - Soil, Air, Water 44(9):1163-1173.			
OECD Harmonized Template:	Adsorption and Desorption			
HERO ID:	5469327			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Relevant testing conditions were reported and appropriate.
	Metric 7:	Testing Consistency	High	Testing conditions that were changed across the study groups were reported and intentional.
	Metric 8:	System Type and Design	High	Equilibrium was established.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods and frequency were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Relative standard deviations were reported and acceptable for the concentration determinations. No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The data reporting was appropriate and the analytical method was suitable for the study type.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was clearly reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			High	

Study Citation:	Andresen, J. A., Muir, D., Ueno, D., Darling, C., Theobald, N., Bester, K. (2007). Emerging pollutants in the North Sea in comparison to Lake Ontario, Canada, data. Environmental Toxicology and Chemistry 26(6):1081-1089.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1619118

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Not Reported
Confidentiality, Type, Guideline	No; Estimation, residence time in German Bight; Estimation, residence time in German Bight
Solvent, Reactivity, Storage, Stability	NA; NR; 2L glass bottles at 4 deg C; NR
Radiolabel, Source, State, Purity	NA; Surface water samples of the German Bight.; NA; NA
Test Method Details, Test Condition Details, and Test Consistency Details	Water samples of the German Bight were taken at 5 m depth at 14 sites of varying distance from the coast. The test substance concentrations in these samples were used to estimate residence time and persistence through the Federal Maritime and Hydrographic Agency's BSHdmod.L model.; Assumed first-order kinetics and continuous sources and used known transportation times (water residence time in the German Bight: 120 days). Concentrations were normalized by salinity, which supported decrease of concentration was mainly due to dilution.; Not Reported
System Type Design	Not Reported
Sampling Frequency and Sampling Details	May 25 - June 6, 2005; Samples collected 5 m below the surface in 10L glass-sphere samplers.
Test Temperature	NR
Results Details	Half-life = no elimination expected
Analytical Method and Analytical Details	GC-MS in selected ion monitoring mode; Samples liquid-liquid extracted and concentrated prior to analysis. RSD: 7-19%. Recovery: 28% (TECP); samples extracted by SPE instead due to low recovery by the primary method.
Transformation Products, Statistics, and Kinetics	NR; Not Reported; Not Reported
Reference Substance and Reference Substance Results	NR; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	N/A	Not applicable for field studies/modeled results.
Domain 2: Test Design	Metric 3: Study Controls	N/A	Not applicable for field studies/modeled results.
	Metric 4: Test Substance Stability	High	The field sample storage conditions were reported and were appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	Medium	The model was presumably suitable for the test substance although limited details were provided.
	Metric 6: Testing Conditions	Low	No sample characteristics were reported however these inputs were not required for model use. Model details, equations, other inputs were not reported.
	Metric 7: Testing Consistency	High	Test substances concentrations were analyzed consistently and model usage was applied consistently.

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Study Citation:	Andresen, J. A., Muir, D., Ueno, D., Darling, C., Theobald, N., Bester, K. (2007). Emerging pollutants in the North Sea in comparison to Lake Ontario, Canada, data. Environmental Toxicology and Chemistry 26(6):1081-1089.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1619118			
Domain	Metric	EVALUATION		Comments
	Metric 8:	System Type and Design	Rating N/A	Not applicable.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment was appropriate for estimating half-lives.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were reported and appropriate but the single sampling campaign may not reflect temporal trends.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Uncertainty in the model outputs was not explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; extraction recovery was reported. Raw concentrations were reported graphically only.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Model kinetics were described generally.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium	The study did not report many details of the model and the basis for how the model works, making it difficult to determine the plausibility of this result.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			Medium	

Study Citation:	Buszka, P. M., Yeskis, D. J., Kolpin, D. W., Furlong, E. T., Zaugg, S. D., Meyer, M. T. (2009). Waste-indicator and pharmaceutical compounds in landfill-leachate-affected ground water near Elkhart, Indiana, 2000-2002. Bulletin of Environmental Contamination and Toxicology 82(6):653-659.
OECD Harmonized Template:	Miscellaneous
HERO ID:	4912133

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; tri(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	no; monitoring; monitoring
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	test chemical concentration measured at an observation well downgradient from a landfill near Elkhart, Indiana and at a domestic well in a neighborhood east of the landfill.; The domestic well water had concentrations of acetaminophen and caffeine larger than the concentrations detected in the observation well water; the authors suggest this indicates domestic well water may be contaminated by nearby septic systems. However, leachate contamination of the domestic well water was also indicated by the presence of benzene, chloroform, 1,2-dichloroethane, vinyl chloride, 1,1-dichloroethane, arsenic, sodium, and calcium.; duplicate samples were obtained and analyzed
System Type Design	Not Reported
Sampling Frequency and Sampling Details	twice for wells downgradient from the landfill, once for domestic well samples; sample dates were 11/16/2000 and 10/31/2002
Test Temperature	NR
Results Details	average concentrations were <0.5 ug/L for all aquifer samples downgradient from the landfill and 0.65 and 0.74 ug/L from the domestic well on 11/15/2000
Analytical Method and Analytical Details	GC/MS; referenced method Zaugg et al 2002: detection limit 0.5 ug/L
Transformation Products, Statistics, and Kinetics	Not Reported; Not Reported; Not Reported
Reference Substance and Reference Substance Results	Not Reported; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The analytical substance source or purity were not reported; however, the omissions were not likely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Some concurrent control details were not reported; however, the lack of data was not likely to have a substantial impact on study results.
	Metric 4: Test Substance Stability	N/A	This metric is not applicable to this study type.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	N/A	This metric is not applicable to this study type.
	Metric 6: Testing Conditions	Medium	Testing conditions were monitored, reported, and appropriate for the method.

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Study Citation:	Buszka, P. M., Yeskis, D. J., Kolpin, D. W., Furlong, E. T., Zaugg, S. D., Meyer, M. T. (2009). Waste-indicator and pharmaceutical compounds in landfill-leachate-affected ground water near Elkhart, Indiana, 2000-2002. Bulletin of Environmental Contamination and Toxicology 82(6):653-659.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	4912133			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 7:	Testing Consistency	Medium	Some test conditions across samples or study groups were not reported, but these discrepancies were not likely to have a substantial impact on study results.
	Metric 8:	System Type and Design	High	Equilibrium is assumed under field conditions.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	The assessment methodology reported the presence of TCEP in groundwater from a domestic well sample; however, the environmental transport (source of TCEP) or persistence of TCEP were not able to be quantified.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome(s) of interest, and used widely accepted methods/approaches for the chemical and media being analyzed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	No confounding variables were noted.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	There was insufficient evidence presented to confirm that parent compound disappearance was not likely due to some other process.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Kinetic calculations were not clearly described.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Medium**

Study Citation:	Camp Dresser & McKee, (1984). Sixteen health and safety studies regarding tris (2-chloroethyl) phosphate with enclosed confidential information and cover letter dated 021389.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5934137

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; AB-90 wastewater
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	diluted with nutrient enriched dilution water; NR; NR; NR
Radiolabel, Source, State, Purity	NA; AB-90 wastewater samples from Mobile Chemical Company; aqueous solution; NA Notes: NA
Test Method Details, Test Condition Details, and Test Consistency Details	Samples analyzed for total Kjeldahl nitrogen, total phosphorous, ammonia nitrogen, total dissolved solids, total suspended solids, total organic carbon (TOC), chemical oxygen demand (COD), biochemical oxygen demand, titanium, sodium, ethylene glycol, and chlorbenzene per Standard Methods, 15th Edition.; For the Warburg test, samples were seeded with activated sludge from a local municipal wastewater treatment plant and batch acclimated.; Various test dilutions
System Type Design	NR
Sampling Frequency and Sampling Details	Approximately 7 times over 190 hours; Not Reported
Test Temperature	NR
Results Details	AB-90 wastewater was non-toxic, with inhibition starting at 25% concentration. Concentrations in mg/L: TKN = 12.5, T-PO4-P = 44.8, NH3-N < 1, TDS = 50,800, TSS = 21, TOC = 15,100, COD = 47,700, BOD = 4000, Titanium < 1, Sodium = 5,750, Ethylene Glycol = 268, Chlorobenzene = 535
Analytical Method and Analytical Details	Warburg Respirometer; Not Reported
Transformation Products, Statistics, and Kinetics	NR; Not Reported; Not Reported
Reference Substance and Reference Substance Results	NR; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	Uninformative	The test substance identity could not be determined from the information provided. This is a serious flaw that makes the study unusable
	Metric 2: Test Substance Purity	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
Domain 2: Test Design	Metric 3: Study Controls	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 4: Test Substance Stability	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.

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Study Citation:	Camp Dresser & McKee, (1984). Sixteen health and safety studies regarding tris (2-chloroethyl) phosphate with enclosed confidential information and cover letter dated 021389.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5934137			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 6:	Testing Conditions	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 7:	Testing Consistency	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 8:	System Type and Design	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Uninformative	The assessment methodology did not address or report the outcome(s) of interest (inhibition potential and wastewater characterization). This is a serious flaw that makes the study unusable.
	Metric 12:	Test Substance Purity	N/A	The assessment methodology did not address or report the outcome(s) of interest. This is a serious flaw that makes the study unusable.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	N/A	Due to limited information reported in the study about the test substance identity and concentration, it is impossible to assess this metric.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**Uninformative**

Study Citation:	Ciccioli, P., Cecinato, A., Brancaleoni, E., Montagnoli, M., Allegrini, I. (1994). Chemical composition of particulate organic matter (POM) collected at Terra Nova Bay in Antarctica. International Journal of Environmental Analytical Chemistry 55(1-4):47-59.
OECD Harmonized Template:	Miscellaneous
HERO ID:	10004516

EXTRACTION

Parameter	Data
CASRN and Test Material	not reported; alkyl phosphates; phosphoric acid esters
Confidentiality, Type, Guideline	None; Monitoring study; Monitoring study
Solvent, Reactivity, Storage, Stability	NR; NR; Environmental samples were wrapped in foil, sealed, and stored at -10°C until analysis.; NR
Radiolabel, Source, State, Purity	NR; Suspended particulate matter samples from the Terra Nova Bay; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Suspended particulate matter samples were and analyzed to identify organic components from anthropogenic sources; sampling was conducted in the Terra Nova Bay at the Italian Station in Antarctica over a 1-week period from January to February 1991.; Samples were extracted using a Soxhlet apparatus for a duration of 8 hours followed by fractionation via column elution using n-hexane, dichloromethane, acetonitrile, and methanol.; Not applicable
System Type Design	Not applicable
Sampling Frequency and Sampling Details	once daily for 5 consecutive days; Suspended particulate matter samples were collected on quartz fiber filters; filter samples were collected with a high volume sampling device using a size selective inlet for collecting particles <10µm.
Test Temperature	Not reported
Results Details	Alkyl phosphates were identified in the acetonitrile fraction extracted from the particulate matter samples, accounting for 56% of the distribution in this fraction; the average contribution of the alkyl phosphates fraction was 17.6% of the total particulate organic matter sampled. Concentrations of phosphoric acid esters present in the particulate matter samples were approximately 1.1, 0.4, 0.3, 0.3, and 0.7 ng/m3 on day 1, 2, 3, 4, and 5, respectively. The study surmises the main pathway for anthropogenic pollution in the Bay is through the marine environment.
Analytical Method and Analytical Details	HPLC; High resolution GC-MS; Not reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	Uninformative	The specific test substance identity could not be determined from the information provided.
	Metric 2: Test Substance Purity	Low	Analytical standards not reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	This metric is not applicable to this study type.
	Metric 4: Test Substance Stability	N/A	This metric is not applicable to this study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	N/A	This metric is not applicable to this study type.
	Metric 6: Testing Conditions	High	Testing conditions were appropriate for this study.

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Study Citation:	Ciccioli, P., Cecinato, A., Brancaleoni, E., Montagnoli, M., Allegrini, I. (1994). Chemical composition of particulate organic matter (POM) collected at Terra Nova Bay in Antarctica. International Journal of Environmental Analytical Chemistry 55(1-4):47-59.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	10004516			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 7:	Testing Consistency	N/A	This metric is not applicable to this study type.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Uninformative	There were differences between the assessment methodology and the intended outcome of interest; alkyl phosphates were identified in POM samples, yet atmospheric deposition rates and atmospheric cycling/transport not experimentally evaluated.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Analytical method details were limited.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	A QSAR model was not reported

Overall Quality Determination**Uninformative**

Study Citation:	Cristale, J., Ramos, D. D., Dantas, R. F., Machulek Junior, A., Lacorte, S., Sans, C., Esplugas, S. (2016). Can activated sludge treatments and advanced oxidation processes remove organophosphorus flame retardants?. Environmental Research 144(Pt A):11-18.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3445164

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Water samples stored at 5°C; sludge samples lyophilized, sieved, and stored frozen; NR
Radiolabel, Source, State, Purity	NA; 5 WWTPs in Catalonia, Spain; NA; NA Notes: Analytical standard obtained from Sigma-Aldrich, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Influent and effluent samples collected from 5 WWTPs in Catalonia, Spain.; WWTP 1: agricultural runoff and urban wastewaters WWTP 2-5: urban and industrial wastewater close to Barcelona city; Samples analyzed in duplicate. Blanks included.
System Type Design	All five WWTPs have secondary activated sludge treatment, WWTP 4 has activated sludge and nitrification/denitrification secondary treatment.
Sampling Frequency and Sampling Details	Two consecutive days in October 2012; 24 h composite samples collected with an automated piston sample collector
Test Temperature	Not reported
Results Details	No removal observed. Influent: approx. 0.3 - 0.5 µg/L, Effluent: approx. 0.4 - 0.6 µg/L
Analytical Method and Analytical Details	GC-EI-MS/MS; LOD 0.004 - 0.150 ug/L (influent), 0.002 - 0.060 ug/L (effluents), 28 - 575 ug/kg (sludge); Liquids extracted by SPE, eluted with DCM/hexane and /acetone, evaporated with N2, redissolved in toluene; solids extracted by ultrasonic bath with ethyl acetate/cyclohexane, cleaned up on Florisil cartridges, dried under N2, resuspended in toluene
Transformation Products, Statistics, and Kinetics	Not reported; Not applicable; Not applicable
Reference Substance and Reference Substance Results	Surrogates triphenyl phosphate-D15 and tributyl phosphate-D27; TPHP-D15 recovery: 100±17% (influent), 85±9% (effluent), 85±11% (sludge), TNBP-D27 recovery: 100±13% (influent), 114±11% (effluent), 96±7% (sludge)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The sample source was reported, the analytical standard source was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Analytical blanks were included.
	Metric 4: Test Substance Stability	High	Sample storage and preparation was reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	Limited operational stages and no operational conditions were reported.
	Metric 7: Testing Consistency	High	Samples were collected and analyzed consistently.
	Metric 8: System Type and Design	N/A	The metric is not applicable to this study type.

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Study Citation:	Cristale, J., Ramos, D. D., Dantas, R. F., Machulek Junior, A., Lacorte, S., Sans, C., Esplugas, S. (2016). Can activated sludge treatments and advanced oxidation processes remove organophosphorus flame retardants?. Environmental Research 144(Pt A):11-18.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3445164			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling was conducted at an acceptable frequency and used appropriate methods.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	High	Variability was addressed in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High	Raw data only reported graphically; percent recovery and limits of detection were reported, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical analysis was not conducted.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Cristale, J., Ramos, D. D., Dantas, R. F., Machulek Junior, A., Lacorte, S., Sans, C., Esplugas, S. (2016). Can activated sludge treatments and advanced oxidation processes remove organophosphorus flame retardants?. Environmental Research 144(Pt A):11-18.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3445164

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Water samples stored at 5°C; sludge samples lyophilized, sieved, and stored frozen; NR
Radiolabel, Source, State, Purity	NA; 5 WWTPs in Catalonia, Spain; NA; NA Notes: Analytical standard obtained from Sigma-Aldrich, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Effluent samples collected from WWTP 5 of the study in Catalonia, Spain, and treated with laboratory-scale ozonation for one hour.; WWTP 5: urban and industrial wastewater Ozone flow rate: 60 L/h Ozone concentration: 10 g O ₃ /N m ³ ; Run in triplicate. TOC (filtered): 18.34 mg C/L, pH (not filtered): 7.58, TSS: 25.8 mg/L
System Type Design	Primary sedimentation, activated sludge, final sedimentation, filtration, laboratory scale ozonation in 2 L reactor
Sampling Frequency and Sampling Details	7 samples collected, frequency NR; Waste water effluent: 24 h composite samples collected with an automated piston sample collector
Test Temperature	20°C
Results Details	Pseudo first-order kinetic constant: 0.004 /min, Approx. 30% degradation
Analytical Method and Analytical Details	GC-EI-MS/MS; LOD 0.002 - 0.060 ug/L (effluents); Samples extracted 2x by vortex agitation and ultrasonic extraction with ethyl acetate/cyclohexane, evaporated under N ₂ flow, resuspended in toluene.
Transformation Products, Statistics, and Kinetics	Not reported; r ² = 0.986; Not applicable
Reference Substance and Reference Substance Results	Surrogates triphenyl phosphate-D15 and tributyl phosphate-D27; TPHP-D15 recovery: 101±76% TNBP-D27 recovery: 76±16%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The sample source was reported, the analytical standard source was reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Analytical blanks were included.
	Metric 4: Test Substance Stability	High	Sample storage and preparation was reported and appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Limited operational stages and no operational conditions were reported; ; Lab-scale secondary treatment reported with appropriate detail.
	Metric 7: Testing Consistency	High	Samples were collected and analyzed consistently.
	Metric 8: System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms	Metric 9: Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.

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Study Citation:	Cristale, J., Ramos, D. D., Dantas, R. F., Machulek Junior, A., Lacorte, S., Sans, C., Esplugas, S. (2016). Can activated sludge treatments and advanced oxidation processes remove organophosphorus flame retardants?. Environmental Research 144(Pt A):11-18.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3445164			
			EVALUATION	
Domain	Metric	Rating	Comments	
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling was conducted at an acceptable frequency and used appropriate methods.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Raw data only reported graphically; percent recovery and limits of detection were reported, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical analysis was conducted appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Cristale, J., Ramos, D. D., Dantas, R. F., Machulek Junior, A., Lacorte, S., Sans, C., Esplugas, S. (2016). Can activated sludge treatments and advanced oxidation processes remove organophosphorus flame retardants?. Environmental Research 144(Pt A):11-18.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3445164

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Water samples stored at 5°C; sludge samples lyophilized, sieved, and stored frozen; NR
Radiolabel, Source, State, Purity	NA; 5 WWTPs in Catalonia, Spain; NA; NA Notes: Analytical standard obtained from Sigma-Aldrich, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Effluent samples collected from WWTP 5 of the study in Catalonia, Spain, and treated with laboratory-scale UV/H2O2 treatment for one hour.; WWTP 5: urban and industrial wastewater Initial added H2O2: 20 mg/L Light source three low pressure Hg UV lamps emitting at 254 nm.; Run in triplicate. TOC (filtered): 18.34 mg C/L, pH (not filtered): 7.58, TSS: 25.8 mg/L
System Type Design	Primary sedimentation, activated sludge, final sedimentation, filtration, laboratory 2L photo-reactor
Sampling Frequency and Sampling Details	0, 2, 4, 7, 10, 30, and 60 min.; Waste water effluent: 24 h composite samples collected with an automated piston sample collector Samples quenched with hydrogen sulfite before analysis.
Test Temperature	25°C
Results Details	Pseudo first-order kinetic constant: 0.008 /min, Approx. 38% degradation
Analytical Method and Analytical Details	GC-EI-MS/MS; LOD 0.002 - 0.060 ug/L (effluents); Samples extracted 2x by vortex agitation and ultrasonic extraction with ethyl acetate/cyclohexane, evaporated under N2 flow, resuspended in toluene.
Transformation Products, Statistics, and Kinetics	Not reported; r ² = 0.953; Not applicable
Reference Substance and Reference Substance Results	Surrogates triphenyl phosphate-D15 and tributyl phosphate-D27; TPHP-D15 recovery: 101±76% TNBP-D27 recovery: 76±16%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The sample source was reported, the analytical standard source was reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Analytical blanks were included.
	Metric 4: Test Substance Stability	High	Sample storage and preparation was reported and appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Limited operational stages and no operational conditions were reported; Lab-scale secondary treatment reported with appropriate detail.
	Metric 7: Testing Consistency	High	Samples were collected and analyzed consistently.
	Metric 8: System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms	Metric 9: Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.

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Study Citation:	Cristale, J., Ramos, D. D., Dantas, R. F., Machulek Junior, A., Lacorte, S., Sans, C., Esplugas, S. (2016). Can activated sludge treatments and advanced oxidation processes remove organophosphorus flame retardants?. Environmental Research 144(Pt A):11-18.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3445164			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling was conducted at an acceptable frequency and used appropriate methods.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability was addressed in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Raw data only reported graphically; percent recovery and limits of detection were reported, the analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistics were conducted appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Deng, M., Kuo, D. T. F., Wu, Q., Zhang, Y., Liu, X., Liu, S., Hu, X., Mai, B., Liu, Z., Zhang, H. (2018). Organophosphorus flame retardants and heavy metals in municipal landfill leachate treatment system in Guangzhou, China. Environmental Pollution 236:137-145.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5162822

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; 10 L amber wide-mouth packers under normal temperature; NR
Radiolabel, Source, State, Purity	NA; Treatment plant for XinFeng landfill leachate; Liquid; NA Notes: Analytical standard obtained from Dr. Ehrensorfer, Augsburg, Bavaria, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Aqueous samples collected from 1600 t/d landfill leachate treatment plant to determine removal efficiency of selected pollutants. Landfill receives 7000 t/d of household, commercial, institutional, and industrial wastes from Guangzhou city, China.; Not reported; Not reported
System Type Design	Regulating pond, membrane bioreactor filter, denitrification, nitrification, denitrification, continuous microfiltration unit, reverse osmosis process
Sampling Frequency and Sampling Details	Once, November 11, 2015; Samples collected from influent, denitrification influent, nitrification effluent, post-denitrification effluent, and final effluent; filtered nitrification effluent too turbid for automated injection and was not analyzed
Test Temperature	16-28°C
Results Details	Removal efficiency: 96.6%, Influent: 928 ng/L, Denitrification influent: 700 ng/L, Second denitrification effluent: 575 ng/L, Final effluent: 31.5 ng/L
Analytical Method and Analytical Details	Gas chromatography with mass spectrometer; analytes separated on DB-5MS capillary column; MS had electron impact ion source operated in selective ion monitoring mode; LOD 0.1 ug/L; Samples filtered, extracted by SPE with an automated extractor and Oasis Hydrophilic-Lipophilic Balance cartridge, eluted with ethyl acetate and DCM, concentrated under N2 and redissolved in ethyl acetate; Recovery 70-78% (surrogate standards)
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not applicable
Reference Substance and Reference Substance Results	Procedural blank; TCEP detected at 0.9 ng/L (final results corrected based on this value)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The sample source was reported, the analytical standard source was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Procedural blanks were included and final results were corrected for the detected quantities in the blank.
	Metric 4: Test Substance Stability	High	Sample storage and preparation (filtering) methods were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	Operational stages but no treatment operational conditions were reported.

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Study Citation:	Deng, M., Kuo, D. T. F., Wu, Q., Zhang, Y., Liu, X., Liu, S., Hu, X., Mai, B., Liu, Z., Zhang, H. (2018). Organophosphorus flame retardants and heavy metals in municipal landfill leachate treatment system in Guangzhou, China. Environmental Pollution 236:137-145.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5162822			
	EVALUATION			
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology allowed for the determination of removal efficiency.
	Metric 12:	Test Substance Purity	Medium	Sampling methods addressed the outcomes of interest but samples collected only once so variation cannot be observed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Suspended particles were filtered and not analyzed, removal only accounts for the soluble fraction.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate; extraction recovery and limits of detection were reported. Raw data were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical analysis or kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Fries, E., Puttmann, W. (2001). Occurrence of organophosphate esters in surface water and ground water in Germany. Journal of Environmental Monitoring 3(6):621-626.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5469312

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Wastewater treatment, domestic, removal efficiency; Wastewater treatment, domestic, removal efficiency
Solvent, Reactivity, Storage, Stability	NA; NR; Amber bottles at 4 deg C; NA
Radiolabel, Source, State, Purity	NA; NA; NA; NA Notes: Analytical standard 97% purity from Sigma-Aldrich
Test Method Details, Test Condition Details, and Test Consistency Details	One influent and one effluent sample was collected in November 2000 from a municipal wastewater treatment plant in Frankfurt/Main, Germany.; Not Reported; NA
System Type Design	NA
Sampling Frequency and Sampling Details	Once; Not Reported
Test Temperature	NR
Results Details	Influent: 21090 ng/L; Effluent: 33783 ng/L; Removal efficiency: -60%
Analytical Method and Analytical Details	GC-MS; Filtered water samples extracted by SPE; recovery: 83%, standard deviation: 12.6%
Transformation Products, Statistics, and Kinetics	NR; Not Reported; Not Reported
Reference Substance and Reference Substance Results	Squalane; NR

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	N/A	Not applicable for field studies.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	Not applicable for field studies.
	Metric 4: Test Substance Stability	High	The storage of the wastewater samples was reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Low	No operational conditions of the wastewater treatment facility were reported, no sample characteristics were reported.
	Metric 7: Testing Consistency	High	Samples were collected and analyzed consistently.
	Metric 8: System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms			

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Study Citation:	Fries, E., Puttmann, W. (2001). Occurrence of organophosphate esters in surface water and ground water in Germany. Journal of Environmental Monitoring 3(6):621-626.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5469312			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining removal efficiency.
	Metric 12:	Test Substance Purity	Low	Sampling methods were not reported, the sampling frequency may not reflect seasonal/temporal changes in removal efficiency.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Variation was not reflected explicitly with the results but was considered along with uncertainty in the extraction efficiency determination.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, extraction efficiency was acceptable. The raw data was reported. Removal efficiency was calculated by the reviewer.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical and kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results are reasonable based on the method but were not compared to any previous studies.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			High	

Study Citation:	Guo, J. H., Simon, K., Romanak, K., Bowerman, W., Venier, M. (2018). Accumulation of flame retardants in paired eggs and plasma of bald eagles. Environmental Pollution 237:499-507.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5166846

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Whole blood stored on ice for less than 48 h, plasma separated and stored in glass tubes at -20°C; egg storage not reported.; NR
Radiolabel, Source, State, Purity	NA; Michigan; NA; NA Notes: Flame retardant standard obtained from Wellington Laboratories (Guelph, ON, Canada), AccuStandard (New Haven, CT), Cambridge Isotope Laboratories, Inc. (Tewksbury, MA), Sigma-Aldrich (St. Louis, MO), and Chem Service (West Chester, PA)
Test Method Details, Test Condition Details, and Test Consistency	Biomagnification study in the eaglets and eggs of bald eagle, <i>Haliaeetus leucocephalus</i> , from food lake trout, <i>Salvelinus namaycush</i> ; Bald eagle, <i>Haliaeetus leucocephalus</i> egg and eaglet plasma samples; n = 13 (inland), 11 (great lakes shoreline); < 1% lipid content in plasma; 5% lipid content in eggs
System Type Design	Field study, Michigan
Sampling Frequency and Sampling Details	2000 and 2012; Egg and plasma samples collected from nests located more than 8.0 km from the Great Lakes shoreline (inland), or less than 8.0 km from the shorelines (Great Lakes)
Test Temperature	Not reported
Results Details	Egg: 3.26 ng/g ww (inland, n = 5), 3.29 ng/g ww (Great Lakes, n=7). Plasma: 0 ng/g ww (inland, n=5), 0 ng/g ww (Great Lakes, n=7) low detection might be due to low recovery for analytical method. Ratio of concentrations to fish were greater than 1, indicating biomagnification; Biomagnification factors of studied compounds ranged from 0.6 (dechlorane) to 170 (TNBP)
Analytical Method and Analytical Details	GC-MS in electron capture negative ionization mode; Limits of detection < 0.01 - 2.36 ng/g ww (eggs), < 0.01-0.59 ng/g ww (plasma); Recovery of surrogate standards 97±22% (plasma), 86±37% (eggs); Plasma liquid-liquid extracted with hexane/methyl t-butyl ether, cleaned on Florisil column, concentrated, solvent exchanged to hexane, concentrated under N2; egg tissue mixed with Na2SO4 and Soxhlet extracted with n-hexane in acetone, cleaned on column
Transformation Products, Statistics, and Kinetics	Not reported; No statistical difference between inland and Great Lake concentrations; quadratic relationship between accumulation and log Kow ($R^2 = 0.80$ p < 0.0001); Not applicable
Reference Substance and Reference Substance Results	Blanks; N.D. - 0.53 ng/g ww (TNBP) in plasma, ND - 1.67 ng/g ww (TCIPP) in eggs

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1:	Test Substance Identity	High The chemical of interest was identified by name.
	Metric 2:	Test Substance Purity	High The sample source was reported.
Domain 2: Test Design			
	Metric 3:	Study Controls	High Blanks were included and were within a valid range.
	Metric 4:	Test Substance Stability	High The sample preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions			
	Metric 5:	Test Method Suitability	High The field study method was appropriate for the chemical of interest.

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Study Citation:	Guo, J. H., Simon, K., Romanak, K., Bowerman, W., Venier, M. (2018). Accumulation of flame retardants in paired eggs and plasma of bald eagles. Environmental Pollution 237:499-507.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5166846			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	No environmental conditions were reported for the samples.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	The organism species and age were reported, no other details provided.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining biomagnification.
	Metric 12:	Test Substance Purity	Medium	Sampling frequency was not reported, sampling period was reported.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Study noted that low extraction recovery in plasma may have contributed to low detections. Great Lake trout concentrations were reported in another study, Guo et al. 2017b.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health or attrition were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate, extraction efficiency and limits of detection were reported; raw data was reported for concentrations in eaglets and eggs but not for fish concentrations; BMF not reported for chemical of interest.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The results were reasonable and comparable to previous studies however the BMF for the chemical of interest was not reported and not enough data was provided for independent determination.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Hallanger, I. G., Sagerup, K., Evenset, A., Kovacs, K. M., Leonards, P., Fuglei, E., Routti, H., Aars, J., Strøm, H., Lydersen, C., Gabrielsen, G. W. (2015). Organophosphorous flame retardants in biota from Svalbard, Norway. Marine Pollution Bulletin 101(1):442-447.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5162922

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NA; NA; NA
Radiolabel, Source, State, Purity	NA; NA; NA; NA
Test Method Details, Test Condition Details, and Test Consistency Details	8 arctic species were sampled from the Svalbard Archipelago, Norway, to investigate occurrence in species and the potential for long-range transport and bioaccumulation and biomagnification.; Mallotus villotus (whole organism) Eggs of Uria lomvia and Larus hyperboreus (whole egg)Rissa tridactyla (liver)Pusa hispida (blubber)Phoca vitulina (blood plasma)Ursus maritimus (blood plasma)Vulpes lagopus (liver); Lipid content: M. villotus 4.02 ± 0.22%, Egg U. lomvia 11.48 ± 1.45 and 11.79 ± 0.88%, Egg L. hyperboreus 7.6 ± 0.24%, R. tridactyla 5.38 ± 0.3%, P. hispida NAP. vitulina 8.7 ± 1.12%, U. maritimus 5.7 ± 0.5 and 6.75 ± 0.73%, V. lagopus 7.17 ± 1.12%
System Type Design	Not applicable
Sampling Frequency and Sampling Details	2007 to 2010; Samples stored at - 20°C, except for blood samples which were stored in cryogenic vials and frozen.
Test Temperature	Not reported
Results Details	Various tissues analyzed from fish, birds, and mammals; the authors note the choice of tissues may not have been appropriate. Mallotus villotus: 7.81±0.6 ng/g lw, Egg Uria lomvia: < 0.6-0.7 ng/g lw, Egg Larus hyperboreus: 10.79 ng/g lw, Rissa tridactyla: 7.89 ± 1.26 ng/g lw, Pusa hispida: < 4.5 ng/g lw, Phoca vitulina: 3.51 ng/g lw, Ursus maritimus: 1.91 and 52.5 ng/g lw, Vulpes lagopus: <0.2 - 1.8 ng/g lw
Analytical Method and Analytical Details	LC-MS/MS, analytes separated on Luna column; Samples homogenized with a blender, freeze-dried, homogenized with a mortar, extracted by DCM:acetone, cleaned up on silica gel and hybrid SPE column; plasma samples precipitated by water:2-propanol, cleaned on OASIS HLB SPE cartridges
Transformation Products, Statistics, and Kinetics	Not applicable; Not reported; Not applicable
Reference Substance and Reference Substance Results	Internal standard recoveries; estimated uncertainty of analytical method 20 - 40%

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The sample sources were reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Analytical blanks were included and within an acceptable range.
	Metric 4: Test Substance Stability	High	Sample collection, storage, and preparation was reported and appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	No environmental conditions were reported for sampling campaigns.

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Study Citation:		Hallanger, I. G., Sagerup, K., Evenset, A., Kovacs, K. M., Leonards, P., Fuglei, E., Routti, H., Aars, J., Strøm, H., Lydersen, C., Gabrielsen, G. W. (2015). Organophosphorous flame retardants in biota from Svalbard, Norway. Marine Pollution Bulletin 101(1):442-447.		
OECD Harmonized Template:		Miscellaneous		
HERO ID:		5162922		
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently per species.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	Medium	Organism species were reported, no other information was included.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology was not able to determine biomagnification due to analysis of different tissues per species.
	Metric 12:	Test Substance Purity	Medium	Sampling methods did not include environmental samples for potential partitioning uptake, bioaccumulation could not be determined.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Authors conclude values are inconclusive because tissues analyzed may not have been appropriate for the study. Uncertainty 20 - 40%.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; limits of detection were reported for some matrices, extraction recovery was not reported. Lipid normalized concentrations were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The authors note the values are inconclusive based on analysis of different tissues per species, which may have been inappropriate. No environmental concentrations were reported for reviewer calculation of bioaccumulation.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	IPCS, (1998). Flame retardants: Tris(chloropropyl) phosphate and tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Miscellaneous
HERO ID:	79051

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Monitoring study results; Monitoring study results
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Wastewater; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency	NR; NR; NR
Details	
System Type Design	NR
Sampling Frequency and Sampling Details	NR; NR
Test Temperature	NR
Results Details	Industrial and domestic wastewater effluents from Kitakyushu, Japan had 0.03 g/L TCEP. 5 sewage treatment plants had effluent concentrations of 0.5–1.2 g/liter and influent concentrations of 0.54 to 1.2.
Analytical Method and Analytical Details	NR; NR
Transformation Products, Statistics, and Kinetics	NR; NR; NR
Reference Substance and Reference Substance Results	NR; NR

Domain		EVALUATION		Comments
	Metric	Rating		
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The test substance source was reported.
Domain 2: Test Design				
	Metric 3:	Study Controls	Medium	Concurrent control group details were not reported.
	Metric 4:	Test Substance Stability	Medium	Test substance stability, homogeneity, preparation, and storage conditions were not reported.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	Medium	Test method details were not reported but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database.
	Metric 6:	Testing Conditions	Medium	Testing conditions are unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 7:	Testing Consistency	Medium	Testing consistency is unknown but are likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 8:	System Type and Design	N/A	Rating of this factor is not applicable to this kind of information.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation: IPCS, (1998). Flame retardants: Tris(chloropropyl) phosphate and tris(2-chloroethyl) phosphate.				
OECD Harmonized Template: Miscellaneous				
HERO ID: 79051				
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	There was incomplete reporting of outcome assessment methods; however, such differences or absence of details were not likely to be severe or have a substantial impact on the study results.
	Metric 12:	Test Substance Purity	Medium	Sampling methodology is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty were not reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Rating of this factor is not applicable to this kind of information.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical method is unknown but is likely to be appropriate based on the data's inclusion in a peer-reviewed/recognized database or other secondary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	No statistical or kinetic analyses were reported; however, these differences were not likely to have a substantial impact on study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		Medium		

Study Citation:	Ishikawa, S., Taketomi, M., Shinohara, R. (1985). Determination of trialkyl phosphates and triaryl phosphates in environmental samples. Water Research 19(1):119-126.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2919504

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Tokyo Chemical Co; NR; Purified by distillation under reduced pressure; checked by GC Notes: TCEP
Test Method Details, Test Condition Details, and Test Consistency Details	Surface water (10 cm deep), seawater (1 m below surface) and surface sediment samples collected near Kitakyushu City in 1980; Not reported; Not reported
System Type Design	NA, field study
Sampling Frequency and Sampling Details	3 experiments; collected in 3-L glass bottles
Test Temperature	Not reported
Results Details	Concentration in river water: ND to 347 ng/L; in seawater: 14-60 ng/L; in sediment: ND-28 ng/L
Analytical Method and Analytical Details	GD-flame photometric detector; Mass spectra analysis compared to standards
Transformation Products, Statistics, and Kinetics	Not reported; Mean values reported, limited statistical details reported; Not reported
Reference Substance and Reference Substance Results	Not applicable; references standards used for MS detection of substances

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2: Test Substance Purity	N/A	The metric is not applicable to this study type (field samples).
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to this study type (field samples).
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this study type (field samples).
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	N/A	The metric is not applicable to this study type (field samples).
	Metric 7: Testing Consistency	N/A	The metric is not applicable to this study type (field samples).
	Metric 8: System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 4: Test Organisms			
	Metric 9: Outcome Assessment Methodology	N/A	The metric is not applicable to this study type (field samples).

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Study Citation:	Ishikawa, S., Taketomi, M., Shinohara, R. (1985). Determination of trialkyl phosphates and triaryl phosphates in environmental samples. Water Research 19(1):119-126.		
OECD Harmonized Template:	Miscellaneous		
HERO ID:	2919504		
		EVALUATION	
Domain	Metric	Rating	Comments
	Metric 10:	Sampling Methods	N/A The metric is not applicable to this study type (field samples).
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High This was primarily a modeling study based on field samples.
	Metric 12:	Test Substance Purity	High This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	High This metric met the criteria for high confidence as expected for this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	High This metric met the criteria for high confidence as expected for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	High This metric met the criteria for high confidence as expected for this type of study.
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	Medium The study results were reasonable.
	Metric 18:	QSAR Models	High This metric met the criteria for high confidence as expected for this type of study.
Overall Quality Determination		High	

Study Citation:	Ji, Y., Wang, Y., Yao, Y., Ren, C., Lan, Z., Fang, X., Zhang, K., Sun, W., Alder, A. C., Sun, H. (2019). Occurrence of organophosphate flame retardants in farmland soils from Northern China: Primary source analysis and risk assessment. Environmental Pollution 247:832-838.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5164207

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; calculation; calculation
Solvent, Reactivity, Storage, Stability	NA; NR; Dried soil samples packed with aluminum foil paper and stores at -20°C; NR
Radiolabel, Source, State, Purity	NA; Urban and rural areas of Beijing and Tianjin, and rural area of Hebei province, China; NA; NA Notes: Analytical standard obtained from Dr. Ehrenstorfer GmbH (Germany)
Test Method Details, Test Condition Details, and Test Consistency	Soil samples collected from urban and rural areas of Beijing and Tianjin, and rural area of Hebei province, China. Concentrations of chemicals of interest in soil were compared to bulk air concentrations sampled during the same time as this study.; Not applicable; Detection frequency: 34.7% in soil from cornfields without agricultural films sampled, soils from forest fields sampled from urban sites when no corn fields available.
System Type Design	Not applicable
Sampling Frequency and Sampling Details	September to November 2016; Mixture of three portions of soil collected at 0 - 15 cm from the surface.
Test Temperature	Not reported
Results Details	Values estimated from figure. Approx. average Log K _{sa} (range): 4.0 (1.89 - 6.0). Approx. Log K _{oa} : 7.5. Average concentration in soil (range): 0.178 ± 0.708 µg/kg (N.D. - 5.89 µg/kg), Atmosphere concentration: not reported.
Analytical Method and Analytical Details	LC-MS with positive ESI in multiple-reaction-monitoring mode, analytes separated on X-terra MS C18 column; detection limit: 0.001 ug/kg; Soil ultrasonic extracted with hexane and acetone, evaporated to near dryness under N ₂ , redissolved in hexane, cleaned up on Florisil SPE cartridge, eluent reconcentrated under N ₂ , reconstituted with methanol; recovery of spiked samples 83.4 - 121%
Transformation Products, Statistics, and Kinetics	Not applicable; SPSS 22.0 spearman correlation analysis of log concentrations, soil texture, and TOC; Simca 13.0 PCA on normalized variables; n = 98; significant correlation to soil TOC not observed.; Not applicable
Reference Substance and Reference Substance Results	Procedure blank; Results were blank-corrected

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The sample and analytical standard sources were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Method blanks were included and values were blank-corrected.
	Metric 4: Test Substance Stability	Medium	Soil sample storage and preparation were reported and appropriate; Atmospheric sampling details were not reported but may be included in a previous publication.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the chemical of interest.
	Metric 6: Testing Conditions	Medium	No sampling conditions (temperature) or sample characteristics for soil or atmospheric samples were reported, despite TOC being measured for soil in this study.

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Study Citation:		Ji, Y., Wang, Y., Yao, Y., Ren, C., Lan, Z., Fang, X., Zhang, K., Sun, W., Alder, A. C., Sun, H. (2019). Occurrence of organophosphate flame retardants in farmland soils from Northern China: Primary source analysis and risk assessment. Environmental Pollution 247:832-838.		
OECD Harmonized Template:		Miscellaneous		
HERO ID:		5164207		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for Ksa determination.
	Metric 12:	Test Substance Purity	Medium	Sampling frequency was not reported for soil or atmospheric samples, atmospheric sample details may be reported in a previous study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Atmospheric data and sampling cannot be verified because this was reported in a previous study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Analytical methods were appropriate; extraction recovery and limits of detection were reported. Summary data for soil was reported, but partition coefficients were reported only graphically.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods and software were reported and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	The results were reasonable based on the method, but the values are only approximate from a figure. Atmospheric values cannot be verified or assessed as they were reported in another study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Kim, S. D., Cho, J., Kim, I. S., Vanderford, B. J., Snyder, S. A. (2007). Occurrence and removal of pharmaceuticals and endocrine disruptors in South Korean surface, drinking, and waste waters. Water Research 41(5):1013-1021.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1413891

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Samples containing the test substance were stored at 4°C and pH <2.; Not reported
Radiolabel, Source, State, Purity	Not reported; Pilot wastewater treatment plant; Not reported; Not reported Notes: Not reported
Test Method Details, Test Condition Details, and Test Consistency Details	The removal efficiency of TCEP from a wastewater treatment plant using several treatments.; The treatment consisted of a membrane bioreactor followed by membrane filtration processes such as reverse osmosis and nanofiltration, as well as UV irradiation. The system consists of an activated sludge tank followed by commercially available plate and frame type membrane modules and a hollow-fiber membrane module.; Not reported
System Type Design	Not reported
Sampling Frequency and Sampling Details	Not reported; Samples were collected during normal periods of operation into amber glass containers, kept on ice, adjusted to pH <2 with sulfuric acid, and stored at 4°C.
Test Temperature	Not reported
Results Details	Influent concentration: 284 ng/L; membrane bioreactor (plate and frame type): 303 ng/L; membrane bioreactor (hollow-fiber type): 283 ng/L; reverse osmosis: 14 ng/L; nanofiltration: 13 ng/L; reverse osmosis-UV irradiation: 25 ng/L; nanofiltration-UV irradiation: 13 ng/L.
Analytical Method and Analytical Details	Liquid chromatography-tandem mass spectrometry (LC-MS/MS); Analytical recovery was between 68-112%. Reporting limit: 10 ng/L.
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was measured in samples by appropriate analytical means.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate blank controls were reported.
	Metric 4: Test Substance Stability	High	The preparation and storage conditions of the samples containing the test substance were reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	Some of the testing conditions were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
	Metric 7: Testing Consistency	High	There were reported differences between the sample groups.
	Metric 8: System Type and Design	N/A	The metric is not applicable to the study type.

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Study Citation:	Kim, S. D., Cho, J., Kim, I. S., Vanderford, B. J., Snyder, S. A. (2007). Occurrence and removal of pharmaceuticals and endocrine disruptors in South Korean surface, drinking, and waste waters. <i>Water Research</i> 41(5):1013-1021.		
OECD Harmonized Template:	Miscellaneous		
HERO ID:	1413891		
Domain	Metric	EVALUATION	
		Rating	Comments
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to the study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium Some details regarding the sampling method were not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium Uncertainty was not reported in the concentrations; however, the omissions are unlikely to have an impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High The analytical method was suitable for the detection and quantification of the target chemical.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium Statistical analysis was not reported; however, the omissions are unlikely to have a substantial impact on the study results.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium No serious study deficiencies were identified and the value is plausible.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.
Overall Quality Determination		High	

Study Citation:	Kim, U. J., Oh, J. K., Kannan, K. (2017). Occurrence, removal, and environmental emission of organophosphate flame retardants/plasticizers in a wastewater treatment plant in New York State. Environmental Science and Technology 51(14):7872-7880.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3862000

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Amber glass bottles, stored at 4°C; NR
Radiolabel, Source, State, Purity	NA; WWTP in Albany, New York; NA; NA
Test Method Details, Test Condition Details, and Test Consistency Details	Influent and effluent wastewater samples, suspended particulate matter (SPM) from aqueous samples, and sludge samples collected from a WWTP in Albany, New York, to determine removal efficiency and distribution of selected pollutants.; Not reported; System capacity: 132 million L/d
System Type Design	Activated sludge treatment
Sampling Frequency and Sampling Details	Monthly, August 2013 - April 2014; composite wastewater samples also collected daily April 27 - May 1, June 27 - June 28 2015; 24 hour composite samples of influent, primary effluent, and final effluent collected; Combined sludge and dewatered sludge cake collected; Ash collected
Test Temperature	Not reported
Results Details	Removal efficiency: Approx. -5% (primary), -19.1% (overall), Influent(aqueous, SPM): 1430 ng/L, 22.5 ng/g dry wt.Primary effluent (aqueous, SPM): 1090 ng/L, 20.4 ng/g dry wt. Secondary effluent (aqueous, SPM): 1100 ng/L, 17.9 ng/g dry wt.Combined sludge: 40.1 ng/g dry wt.Ash: 47.7 ng/g dry wt.Sludge cake: 78.9 ng/g dry wt.
Analytical Method and Analytical Details	HPLC with electrospray triple quadrupole mass spectrometry; analyte separated by Luna C18 column and Betasil C18 guard column; LOD 1-100 ng/L (aqueous), 0.05 - 10 ng/g dry wt. (solid); Recovery 85.5-110% (water), 83.7-109% (SPM), 82.7-101% (sludge); Water samples extracted by SPE with Oasis HLB cartridges, eluted 3x with methanol, concentrated; SPM extracted 3x by ASE with ethyl acetate and n-hexane, concentrated; sludge extracted by UAE in methanol, DCM and n-hexane, and concentrated
Transformation Products, Statistics, and Kinetics	Not reported; Averages of n = 48 samples; Not applicable
Reference Substance and Reference Substance Results	Field blanks, analytical blanks; Not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified by name.
	Metric 2:	Test Substance Purity	High	The sample source was reported generally.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Analytical and field blanks were included, results were assumed to be within an acceptable range.
	Metric 4:	Test Substance Stability	High	Sample storage and preparation were reported and appropriate.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	No operational parameters and minimal operational stages for the WWTP were reported.

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Study Citation:	Kim, U. J., Oh, J. K., Kannan, K. (2017). Occurrence, removal, and environmental emission of organophosphate flame retardants/plasticizers in a wastewater treatment plant in New York State. Environmental Science and Technology 51(14):7872-7880.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3862000			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	Medium	Sampling methods addressed the outcomes of interest, number of replicates not reported, seasonal variability was not addressed.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Concentration ranges were reported, standard deviations or other statistical comparisons were not calculated.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, extraction recovery and limits of detection were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical or kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method; however, without WWTP operational information broader conclusions cannot be determined from the data.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Kurt-Karakus, P., Alegria, H., Birgul, A., Gungormus, E., Jantunen, L. (2018). Organophosphate ester (OPEs) flame retardants and plasticizers in air and soil from a highly industrialized city in Turkey. Science of the Total Environment 625:555-565.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5017070

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Air and soil monitoring; Air and soil monitoring
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Labeled recovery surrogate chemical d12-trischloroethyl phosphate (TCEP) was obtained from Cambridge Isotope Laboratories (Andover, MA, USA).; Field samples; Not reported; Not reported
Test Method Details, Test Condition Details, and Test Consistency	Air and soil samples from 8 sites near Bursa, Turkey were collected over a one year sampling period.; Not reported; Not reported
Details	
System Type Design	Not reported
Sampling Frequency and Sampling Details	Sampling was done during 5 periods: Feb-Apr, Apr-Jun, Jun-Aug, Aug-Oct, Oct-Dec.; Air sampling sites were selected to be representative of the region but away from direct sources (e.g., automotive, textile/upholstery and furniture manufacturers). Soils were collected from the same sites on the first day of air passive sampling.
Test Temperature	Not reported
Results Details	Average air concentration (pg/m3): 90. Standard deviation: 31; n = 40; median: 81; range: below detection-143. Median soil concentration (ng/g dw): 1.56; range: 1.03-2.30.
Analytical Method and Analytical Details	Gas chromatography-mass selective detector operating in electron impact (GC-EI-MS); Agilent 6890 GC-5973 and 5975 Mass Selective Detector. Recovery was >80%.
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was identified using appropriate analytical methods.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate blank controls were reported in the analytical procedure.
	Metric 4: Test Substance Stability	Medium	Some details regarding the storage of the test samples was not reported; however, the omission is unlikely to have a substantial impact on the study results.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	Field conditions including temperature and wind direction were reported.
	Metric 7: Testing Consistency	N/A	The metric is not applicable to the study type.

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Study Citation:	Kurt-Karakus, P., Alegria, H., Birgul, A., Gungormus, E., Jantunen, L. (2018). Organophosphate ester (OPEs) flame retardants and plasticizers in air and soil from a highly industrialized city in Turkey. Science of the Total Environment 625:555-565.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5017070			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	High	The system type was appropriate.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Variability in the measurements were reported and unlikely to have an impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination			Low	

Study Citation:	Lai, S., Xie, Z., Song, T., Tang, J., Zhang, Y., Mi, W., Peng, J., Zhao, Y., Zou, S., Ebinghaus, R. (2015). Occurrence and dry deposition of organophosphate esters in atmospheric particles over the northern South China Sea. Chemosphere 127(Elsevier):195-200.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3013239

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris-(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Monitoring study; NR; NR Notes: TCEP
Test Method Details, Test Condition Details, and Test Consistency Details	Airborne particulate and gas samples were taken simultaneously during a 20-d cruise campaign in the north part of the SCS during the period of September to October 2013.; northern South China Sea monitoring; Tris-(2-chloroethyl) phosphate (TCEP) was the predominant OPE compound in the samples (45.0±12.1%); Not reported
System Type Design	integrated air sampler
Sampling Frequency and Sampling Details	10 sets of air samples were collected during the campaign; Air mass back-trajectories were calculated along the sampling route using NOAA's HYSPLIT model and were traced back 72 h at a height of 200 m.
Test Temperature	Not reported
Results Details	estimated dry deposition flux = 7.9±5.0 ng/m ² /d
Analytical Method and Analytical Details	GC-MS; mean recovery rates of internal standard spiked experiments 107±4% (TCPP) to 139±12% (TEHP); concentrations of OPEs are corrected with the recoveries of internal standard
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	N/A	The metric is not applicable to this study type.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to this study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this study type.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	N/A	The metric is not applicable to this study type.
	Metric 6: Testing Conditions	N/A	The metric is not applicable to this study type.
	Metric 7: Testing Consistency	N/A	The metric is not applicable to this study type.
	Metric 8: System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms			

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Study Citation:	Lai, S., Xie, Z., Song, T., Tang, J., Zhang, Y., Mi, W., Peng, J., Zhao, Y., Zou, S., Ebinghaus, R. (2015). Occurrence and dry deposition of organophosphate esters in atmospheric particles over the northern South China Sea. Chemosphere 127(Elsevier):195-200.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3013239			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcomes of interest.
	Metric 12:	Test Substance Purity	N/A	The metric is not applicable to this study type.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Sources of variability and uncertainty in the measurements were not identified.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Reporting was acceptable for this study type.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Model calculations were described and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Li, J., Xie, Z., Mi, W., Lai, S., Tian, C., Emeis, K. C., Ebinghaus, R. (2017). Organophosphate esters in air, snow, and seawater in the North Atlantic and the arctic. Environmental Science and Technology 51(12):6887-6896.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3862723

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Atmospheric particle samples collected on glass fiber filters (-4°C) and gaseous phase collected on resin column (-20°C); snow samples collected in stainless steel barrels (-20°C), seawater samples collected in glass bottles (4°C); NR
Radiolabel, Source, State, Purity	NA; Atlantic and Arctic Ocean (50 deg N -80 deg N); NA; NA
Test Method Details, Test Condition Details, and Test Consistency Details	During the ARK-XXVIII/2 expedition in the Atlantic and Arctic oceans, atmosphere particulate, air, snow, and seawater samples were collected to determine spatial distribution of pollutants, and estimate air-seawater gas exchange flux; Air mass back trajectories calculated for air stations with NOAAs HYSPLIT model (in 6 h steps, tracked for 120 h at 10 m above sea level); Relative humidity: 75 - 98%
System Type Design	Not applicable
Sampling Frequency and Sampling Details	collected in Arctic and North Atlantic between 8 - 24 June 2014 (air, n = 9); 15 - 25 June 2014 (snow, n=6); 8 - 26 June 2014 (seawater, n = 25); Air samples collected by high-volume air pump at 15 m ³ /h for 24-48h. Atmospheric particle samples collected with glass fiber filter; gaseous phase collected using PUF/XAD-2 resin column; snow samples collected on arctic sea ice, seawater samples collected
Test Temperature	-4 to 12°C
Results Details	74% in particulate phase (may be overestimated as breakthrough of OPEs occurred during sampling)Rate of atmospheric dry deposition: 2 - 12 ng/m ² dAir-seawater gas exchange (fa/fw): 0.01 - 0.7, volatilization dominated in all samplesAir-seawater flux: 5 - 1075 ng/m ³ dAverage gaseous phase (range): 23 (4 - 92) pg/m ³ Average particulate phase (range): 48 (26 - 136) pg/m ³ Average snow (range): 1293 (554 - 2440) pg/LAverage seawater: 695 (n.d. - 2401) pg/L
Analytical Method and Analytical Details	GC-MS/MS; MDL 0.0003 - 1.5 pg/m ³ (gaseous), 0.0002 - 6.5 pg/m ³ (particle), 7 - 210 pg/L (snow and seawater); Columns and filters Soxhlet extracted with DCM and concentrated; melting snow and seawater liquid-liquid extracted 3x with DCM and concentrated; Recovery: 88 ± 13 to 145 ± 9% (columns), 107 ± 4 to 1390 ± 12% (filters), 78 ± 3 to 95 ± 8% (liquid)
Transformation Products, Statistics, and Kinetics	Not applicable; Not reported; Dry deposition fluxes calculated by multiplying particle concentration by estimates dry deposition velocity, 86.4 m/d
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The sample source was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Method and field blanks were included and responded within an acceptable range.
	Metric 4: Test Substance Stability	High	Sample storage conditions and processing were reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.

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Study Citation:	Li, J., Xie, Z., Mi, W., Lai, S., Tian, C., Emeis, K. C., Ebinghaus, R. (2017). Organophosphate esters in air, snow, and seawater in the North Atlantic and the arctic. Environmental Science and Technology 51(12):6887-6896.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3862723			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 6:	Testing Conditions	Medium	Minimal environmental conditions or sample characteristics were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods and frequency were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty in the percentage in the particulate phase was addressed, variation between sites was discussed in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Raw data was provided, the analytical method was appropriate, extraction recovery and limits of detection were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Air-sea flux calculations described in supplemental information, dry deposition flux calculations described vaguely.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.

Overall Quality Determination**High**

Study Citation:	Liang, K., Liu, J. (2016). Understanding the distribution, degradation and fate of organophosphate esters in an advanced municipal sewage treatment plant based on mass flow and mass balance analysis. Science of the Total Environment 544:262-270.
OECD Harmonized Template:	Miscellaneous
HERO ID:	3373199

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Aqueous samples filtered and stored at 4°C. Suspended solids freeze dried, ground, sieved, and stored at -20°C; NR
Radiolabel, Source, State, Purity	NA; Samples collected from STP in Beijing, China; NA; NA
Test Method Details, Test Condition Details, and Test Consistency Details	Samples were collected at every operational stage of an STP in Beijing, China, which treats domestic waste, in order to determine pollutant distribution and removal efficiency.; HRT anaerobic tank: 1.5 hours HRT anoxic tank: 3 h HRT aerobic tank: 10.8 h HRT secondary sedimentation tank: 8h Total solid retention time: 20 - 25 d; Samples collected under normal dry weather
System Type Design	Aerated grit chamber, anaerobic treatment, aerobic treatment, secondary clarifier, hyperfiltration, ozonation, and chlorination
Sampling Frequency and Sampling Details	March 24, 25, and 26, 2014; Samples single 24 h composites, collected at outlet of aerated grit chamber, anaerobic tank, anoxic tank, aerobic tank, secondary sedimentation tank, ultrafiltration tank, ozonation tank, and the chlorination tank. Dewater sludge samples also collected.
Test Temperature	Not reported
Results Details	Influent: 179.1 ng/L Secondary effluent: 213.0 ng/L, Tertiary effluent: 232.9 ng/L, Raw sludge: ND Removal: 14% (anaerobic), 16% (anoxic), -16% (aerobic), -41% (secondary sedimentation), -6.6% (ultrafiltration), -5.6% (ozonation), 2.8% (chlorination); Total removal: -30.1%, Combined primary and secondary treatment removal: -18.9%, Negative removal may be due to release from polymeric particles of raw sewage.
Analytical Method and Analytical Details	Analytes separated by Waters Acquity UPLC BEH C18 column, analyzed by GC-MS with electrospray ionization source in positive ion mode; LOD 0.57-6.6 ng/g (suspended solids), 0.30 - 5.7 ng/L (aqueous); Aqueous samples extracted onto HLB cartridges, eluted by acetonitrile, concentrated to dryness and redissolved in acetonitrile:water. Solid samples extracted onto Florisil cartridges, eluted by DCM, concentrated, redissolved in acetonitrile:water.
Transformation Products, Statistics, and Kinetics	Not reported; Observed log Kd had a weak correlation to mass loss fraction in traditional treatment ($r^2 = 0.29$, $p = 0.08$); hydrophobicity was not the primary factor for differences in biodegradation removal in studied pollutants.; Not applicable
Reference Substance and Reference Substance Results	Spiked samples recovery; 52.0-119% (raw sewage aqueous sample); 43.6-114% (tertiary effluent water); 33.0-114% (suspended solids from excess sludge)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was reported by name.
	Metric 2: Test Substance Purity	High	The source of the samples was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Analytical or field blanks were not explicitly included, they may be reported in supplemental information.
	Metric 4: Test Substance Stability	High	Sample storage conditions and preparation were reported and appropriate for the study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was appropriate for the test substance.

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Study Citation:	Liang, K., Liu, J. (2016). Understanding the distribution, degradation and fate of organophosphate esters in an advanced municipal sewage treatment plant based on mass flow and mass balance analysis. Science of the Total Environment 544:262-270.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	3373199			
Domain	Metric	EVALUATION		Comments
	Metric 6:	Testing Conditions	High	Operational stages and most operational conditions were reported for the STP, temperature was not reported.
	Metric 7:	Testing Consistency	Medium	Samples were collected consistently, but no details supporting that the composite samples were comparable was provided, may be included in supplemental information.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the outcomes of interest.
	Metric 12:	Test Substance Purity	High	Samples collection frequency was acceptable and collection followed accepted methods.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty in fate was discussed in data evaluation and variability was addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Some raw data reported, percent recovery and limits of detection reported, analytical method was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical methods were conducted but not described, may be included in supplemental information.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable and comparable to previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Marklund, A., Andersson, B., Haglund, P. (2005). Organophosphorus flame retardants and plasticizers in Swedish sewage treatment plants. Environmental Science and Technology 39(19):7423-7429.
OECD Harmonized Template:	Miscellaneous
HERO ID:	8683710

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; Wastewater and sludge samples frozen immediately and stored at -18 °C until analysis; NR
Radiolabel, Source, State, Purity	NR; Sewage treatment plant samples; analytical standard from Labora (Sollentuna, Sweden); NR; 97%
Test Method Details, Test Condition Details, and Test Consistency Details	Influent, effluent, and sludge samples collected from 11 Swedish sewage treatment plants (STPs) in 2003.; Small, medium, and large STPs with operational flow ranging from 182E3 m3/year to 107,000E3 m3/year.; Small STPs with negligible industrial loads, medium-sized STPs receiving water from large industrial sites, and large STPs serving big cities.
System Type Design	Plants using a variety of mechanical, chemical and biological treatments were evaluated.
Sampling Frequency and Sampling Details	Not specified; Samples collected under normal operating conditions. Water samples representing weekly averages were collected using automatic sampling equipment. Sludge composite samples collected.
Test Temperature	Not reported
Results Details	Mean values reported: influent 0.70 tons, effluent 0.76 tons (110% of influent), sludge 0.01 tons (1.3% of influent) overall degradation = +9%
Analytical Method and Analytical Details	GC-NPD (nitrogen phosphorus detector) and GC-MS-EI; average limit of detection (LOD): 1.8 ng/L and ranged from 0.8 to 2.9 ng/L for wastewater samples and was 1.8 ng/L and ranged from 0.2 to 5.1 ng/L for sludge samples
Transformation Products, Statistics, and Kinetics	Not reported; standard deviation was less than 10%; Degradation = [(sludge amt + Effluent amt - Influent amt)/Influent amt] x 100
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	Analytical standard source reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Analytical blanks were included.
	Metric 4: Test Substance Stability	High	Sample preparation and storage conditions were reported.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable.
	Metric 6: Testing Conditions	Medium	Some operating conditions were not reported.
	Metric 7: Testing Consistency	Medium	Small, medium and large STPs were evaluated; STPs had various operating conditions.
	Metric 8: System Type and Design	N/A	The systems were appropriate.
Domain 4: Test Organisms			

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Study Citation:	Marklund, A., Andersson, B., Haglund, P. (2005). Organophosphorus flame retardants and plasticizers in Swedish sewage treatment plants. Environmental Science and Technology 39(19):7423-7429.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	8683710			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	This metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data were reported for 11 STPs; individual plant data was not included.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High		

Study Citation:	Meyer, J., Bester, K. (2004). Organophosphate flame retardants and plasticisers in wastewater treatment plants. Journal of Environmental Monitoring 6(7):599-605.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5162720

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Stored at 4°C prior to extraction; NR
Radiolabel, Source, State, Purity	NA; STPA in North Rhine-Westphalia, Germany; NA; NA Notes: Analytical standard obtained from Sigma-Aldrich, Steinheim, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Wastewater samples collected from STP in Germany to determine removal efficiency of selected pollutants.; Not reported; Wastewater volume: 220,000 m ³ /d Serves 1,100,000 inhabitants
System Type Design	Two-stage biological treatment: First aeration basin, intermediate settling tank, second aeration basin (denitrification), final settling tank, gravel filter bed
Sampling Frequency and Sampling Details	Spring 2003; February 16 - 18, 23 - 27; March 4 - 6, 9 - 13, 16 - 18, 20, 24-25; Collected at influent, effluent of intermediate settling tank, effluent of final settling tank, and final effluent; collected as 24-hr composite samples
Test Temperature	Not reported
Results Details	Removal efficiency: None, Mean influent (max.): 290 ng/L (640 ng/L), Mean effluent (max.): 350 ng/L (410 ng/L), Mean effluent initial settling tank (max.): 460 ng/L (380 ng/L), Mean effluent final settling tank (max.): 350 ng/L (430 ng/L)
Analytical Method and Analytical Details	Gas chromatography with mass spectrometric detection; analytes separated on DB-5MS column; mass spectrometer used with electron impact ionization, in selected ion monitoring mode; LOD 6.1 ng/L; Samples extracted by SPE with DVB-hydrophobic Speedisks, eluted with MTBE and toluene, residual water removed by freezing, samples concentrated on rotary evaporator, cleaned on silica gel column and concentrated again; recovery 83% (RSD 8%)
Transformation Products, Statistics, and Kinetics	Not applicable; Not reported; Not applicable
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The WWTP sample source was reported.
Domain 2: Test Design	Metric 3: Study Controls	Medium	Analytical or field blanks were not explicitly included.
	Metric 4: Test Substance Stability	Medium	Sample collecting and storage was reported generally.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method is suitable for the test substance.
	Metric 6: Testing Conditions	Medium	WWTP operational stages but no conditions (temperature, HRT, etc.) were reported.
	Metric 7: Testing Consistency	High	Samples were collected and processed consistently.

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Study Citation:	Meyer, J., Bester, K. (2004). Organophosphate flame retardants and plasticisers in wastewater treatment plants. Journal of Environmental Monitoring 6(7):599-605.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5162720			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	N/A	Not applicable.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining removal efficiency.
	Metric 12:	Test Substance Purity	High	Sampling methods were at an acceptable frequency for the study type and sample extraction methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Aqueous samples were collected and analyzed, suspended solids may not have been considered. No minimum detected concentrations reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate; extraction recovery and limits of detection were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical analysis or kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method; however, without operational conditions, little can be determined of broader trends on removal efficiency.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Meyer, J., Bester, K. (2004). Organophosphate flame retardants and plasticisers in wastewater treatment plants. Journal of Environmental Monitoring 6(7):599-605.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5162720

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Stored at 4°C prior to extraction; NR
Radiolabel, Source, State, Purity	NA; STPB in North Rhine-Westphalia, Germany; NA; NA Notes: Analytical standard obtained from Sigma-Aldrich, Steinheim, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Wastewater samples collected from STP in Germany to determine removal efficiency of selected pollutants.; Not reported; Wastewater volume: 108,959 m ³ /d Serves 1,090,000 inhabitants
System Type Design	Single-stage activated sludge plant: Primary settling tank, aeration basin (denitrification), final settling tank, filter (stream contact filtration)
Sampling Frequency and Sampling Details	Spring 2003; February 23 - 27; March 5, 10, 12, 18 - 19, 24-25.; Collected at influent, effluent of intermediate settling tank, effluent of final settling tank, and final effluent; collected as 24-hr composite samples
Test Temperature	Not reported
Results Details	Removal efficiency: None, Mean influent (max.): 180 ng/L (250 ng/L), Mean effluent (max.): 370 ng/L (470 ng/L), Mean effluent primary settling tank (max.): 310 ng/L (250 ng/L), Mean effluent final settling tank (max.): 560 ng/L (660 ng/L), Elimination: None
Analytical Method and Analytical Details	Gas chromatography with mass spectrometric detection; analytes separated on DB-5MS column; mass spectrometer used with electron impact ionization, in selected ion monitoring mode; LOD 6.1 ng/L; Samples extracted by SPE with DVB-hydrophobic Speedisks, eluted with MTBE and toluene, residual water removed by freezing, samples concentrated on rotary evaporator, cleaned on silica gel column and concentrated again; recovery 83% (RSD 8%)
Transformation Products, Statistics, and Kinetics	Not applicable; Not reported; Not applicable
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The WWTP sample source was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	Medium	Analytical or field blanks were not explicitly included.
	Metric 4: Test Substance Stability	Medium	Sample collecting and storage was reported generally.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method is suitable for the test substance.
	Metric 6: Testing Conditions	Medium	WWTP operational stages but no conditions (temperature, HRT, etc.) were reported.
	Metric 7: Testing Consistency	High	Samples were collected and processed consistently.
	Metric 8: System Type and Design	N/A	Not applicable.

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Study Citation:	Meyer, J., Bester, K. (2004). Organophosphate flame retardants and plasticisers in wastewater treatment plants. Journal of Environmental Monitoring 6(7):599-605.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5162720			
		EVALUATION		
Domain	Metric	Rating	Comments	
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining removal efficiency.
	Metric 12:	Test Substance Purity	High	Sampling methods were at an acceptable frequency for the study type and sample extraction methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Aqueous samples were collected and analyzed, suspended solids may not have been considered. No minimum detected concentrations reported.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate; extraction recovery and limits of detection were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical analysis or kinetic calculations were not conducted.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method; however, without operational conditions, little can be determined of broader trends on removal efficiency.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Mihajlovic, I., Fries, E. (2012). Atmospheric deposition of chlorinated organophosphate flame retardants (OFR) onto soils. Atmospheric Environment 56:177-183.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2662833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Soil samples were collected from a 1m x 1m meter sampling site located 3 km from the City of Osnabrueck, Germany at the beginning and end of snowfall and rainfall events, as well as the following days after.; Not Reported; Samples were collected from the same sampling site and composites were made from 6 samples.
System Type Design	Not Reported
Sampling Frequency and Sampling Details	Samples were collected 0h, 24h, and 7d after snowfall, 0h and 24h after snow melting began, 0, 1, 24, and 48h after rain began, and for 3 consecutive dry days.; Soil depth was 5-20 cm. Samples were stored at -15°C. Water content of soil was 27.7-31.4% by weight.
Test Temperature	Temperatures ranged from -7.0 to 5.4°C during the snowfall sampling period, 0.6 to 10.1°C during the rainfall sampling, and -3.7 to 12.6°C during the dry deposition sampling period.
Results Details	Calculated fugacity fractions (Ff) = Fs/(Fs + Fa), where Fs is the fugacity in soil and Fa is the fugacity in air, ranged from 0.011-0.073 across all sampling periods, indicating net deposition was the dominant process in air-soil exchange.
Analytical Method and Analytical Details	GC-MS; LOD for TCEP: 0.2 ng/g; Recovery of TCEP: 89.6%; RSD of 6 replicate recovery standards (10.9%).
Transformation Products, Statistics, and Kinetics	Not reported; Fugacity in soil, Fs, was calculated using the concentration in soil, the mean daily temperature, Koa, soil density, and the fraction of organic matter. Fugacity in air was calculated using air temperature and concentration in air.; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	Medium	The test substance purity was not reported but the omission is unlikely to have a substantial impact on the study results.
Domain 2: Test Design	Metric 3: Study Controls	Medium	The use of blanks was not reported but the omission is unlikely to have a substantial impact on the study results.
	Metric 4: Test Substance Stability	High	The preparation, homogeneity, and storage conditions of the samples containing the test substance were reported and appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	The testing conditions were reported and appropriate.

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Study Citation:	Mihajlovic, I., Fries, E. (2012). Atmospheric deposition of chlorinated organophosphate flame retardants (OFR) onto soils. Atmospheric Environment 56:177-183.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	2662833			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 7:	Testing Consistency	High	The test conditions were reported across the sample groups and changes in the conditions were reported.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Uncertainty was not reported in the fugacity results but was reported for some of the TCEP concentrations in soil and was acceptable.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was suitable and the detection limits and recoveries were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis was clearly reported and appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

Study Citation:	Na, G., Hou, C., Li, R., Shi, Y., Gao, H., Jin, S., Gao, Y., Jiao, L., Cai, Y. (2020). Occurrence, distribution, air-seawater exchange and atmospheric deposition of organophosphate esters (OPEs) from the Northwestern Pacific to the Arctic Ocean. Marine Pollution Bulletin 157:111243.
OECD Harmonized Template:	Miscellaneous
HERO ID:	10004749

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	none; experimental; experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Standards from Dr. Ehrenstorfer (Augsberg, Germany); Monitoring samples from the Northwestern Pacific and the Arctic Ocean; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Gas-particle partitioning was evaluated by measuring the particle-bound fraction; allocation in the air was assessed using the ratio of the concentration of the chemical in particle phase to total concentration in both gaseous and particle phases. The equation: $f(\text{part}) = c(\text{part}) / (c_{\text{gas}} + c_{\text{part}})$; where $f(\text{part})$ is particle-bound fraction, $c(\text{gas})$ and $c(\text{part})$ are the gaseous and particle-bound concentrations, respectively. Air-seawater exchange flux (FAW) was calculated according to the equation: $F_{\text{aw}} = k_{\text{ol}} (C_{\text{w}} - C_{\text{a}} R / H)$, where k_{ol} is the overall mass transfer coefficient (m/d), c_{w} is the dissolved concentration of sea water (ng/m ³), c_{a} is the gaseous concentration of air (ng/m ³), R is the gas constant (Pa·m ³ / (K·mol)), T is the temperature (K), and H is the Henry Law's Constant (Pa·m ³ /mol).; Air and seawater sampling conducted in 2018; wind speeds ranged from 1.5 to 8.4 m/s during air sampling and 0.7 to 11 m/s.; Samples collected between July and September 2018.
System Type Design	Not applicable
Sampling Frequency and Sampling Details	Not reported; Air samples were collected (12 in northwestern Pacific, 18 in the Arctic) using a high volume sampler equipped with a glass fiber filter (GFF) for particle-bound organophosphate esters and a polyurethane foam (PUF) plug (column, diameter: 89 mm, high: 52 mm) to capture the gas phase organophosphate esters; seawater samples were collected (5 in northwestern Pacific, 21 in the Arctic) in glass bottles and concentrated via GFF to capture the gas phase organophosphate esters.
Test Temperature	Ambient; air temperatures ranged from -0.36 to 31.43°C, water temperatures ranged from -1.21 to 8.02°C
Results Details	Mean concentrations of TCEP in the dissolved phase = 9900 pg/L, and the particle phase = 1791 pg/L of seawater. Mean concentrations of TCEP in the gaseous phase = 117 pg/m ³ , and the particle phase = 165 pg/m ³ of air. Particle bound fractions from all sampling points ranged from 3.8-96.6%. TCEP dry deposition flux: 2.6 to 88.0 ng/m ² /day (reported in text but does not seem to match graph). Significant negative correlations between temperature and the particle-bound fractions of TCEP ($p < 0.001$) were observed suggesting temperature might be a driving factor of gas-particle partitioning of OPEs in the northwestern Pacific and Arctic Oceans.
Analytical Method and Analytical Details	HPLC coupled with a triple quadrupole mass spectrometer equipped with an electrospray ionization source using electrospray ionization positive ion and selected reaction monitoring (SRM) mode; TPrP-d21 was used as a surrogate standard.; MDL: 3.65 pg/L (dissolved seawater samples), 3.88 pg/L (particle seawater samples), 0.01 pg/m ³ (gaseous air samples); 0.004 pg/m ³ (particle air samples). Mean recovery rates: 87.37% (seawater) and 94.66% (air). Concentrations were corrected for surrogate standards recovery. Experimental concentrations were corrected using field and procedural blanks.
Transformation Products, Statistics, and Kinetics	Not reported; Statistical analyses conducted with Microsoft Excel 2016; Pearson correlation analysis was with IBM SPSS Statistics V25.0, p -values < 0.05 .; Max K_{aw} (exchange flux) = -1172 pg/m ² /day (deposition)
Reference Substance and Reference Substance Results	Not reported; Other research used for comparison showed opposite results: net exchange flux of TCEP over the North Atlantic and Arctic ocean was 5 – 1075 ng/m ² /day.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1:	High	The test substance was identified.

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Study Citation:	Na, G., Hou, C., Li, R., Shi, Y., Gao, H., Jin, S., Gao, Y., Jiao, L., Cai, Y. (2020). Occurrence, distribution, air-seawater exchange and atmospheric deposition of organophosphate esters (OPEs) from the Northwestern Pacific to the Arctic Ocean. Marine Pollution Bulletin 157:111243.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	10004749			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 2:	Test Substance Purity	High	The source of the test substance was reported; analytical standards included.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Appropriate controls were included.
	Metric 4:	Test Substance Stability	N/A	This metric is not applicable to the study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	High	Conditions were reported.
	Metric 7:	Testing Consistency	High	Variations in temperature were evaluated.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to the study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to the study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to the study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Statistical techniques and between study groups were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to the study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Calculations were clearly described and address the dataset.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to the study.

Overall Quality Determination**High**

* Related References: Supporting information document HERO ID 10213518

Study Citation:	NIVA, (2008). Screening of selected metals and new organic contaminants 2007: Phosphorus flame retardents, polyfluorinated organic compounds, nitro-PAHs, silver, platinum and sucralose in air, wastewater treatment facilities, and freshwater and marine recipients.
OECD Harmonized Template:	Miscellaneous
HERO ID:	10005023

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; tri(2-chloroethyl)phosphate
Confidentiality, Type, Guideline	None; Monitoring study; Monitoring study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Samples from three domestic wastewater treatment plants were analyzed. Waste water is primarily household water and ca. 30% light industrial wastewater.; Wastewater treatment plant samples (water, sludge) collected from Oslo (Bekkelaget), Drammen (Solumstrand) and Arendal (Saulekilen). The water treatment process involves pre-treatment sieving, pre-sedimentation, and polishing; anaerobic digestion of activated sludge at 55C and simultaneous precipitation with iron sulphate, followed by dewatering via centrifugation to 30-35% solids.; not applicable
System Type Design	Oslo, Bekkelaget: treatment system based on activated sludge combined with simultaneous precipitation with iron sulphate; Drammen, Solumstrand: treatment system based on chemical precipitation with lime and seawater and sedimentation; Arendal, Saulekilen: treatment system based on chemical precipitation with PAX18 and anaerobic digestion.
Sampling Frequency and Sampling Details	Influent and effluent samples collected over a 7 day period; sub-samples collected every 30-60 minutes; Influent and effluent flow proportional composite water samples were collected using stationary automatic samplers. Samples were prepared by appropriate extraction and clean-up procedures prior to GC-MS analysis.
Test Temperature	Not reported
Results Details	TCEP concentrations from 3 domestic wastewater treatment facilities (3 influent samples, 3 effluent and 2 sludge samples): Bekkelaget-WWTP influent discharge water: 2000 ng/L, Bekkelaget-WWTP effluent discharge water: 2200 ng/L, Bekkelaget-WWTP sludge: <9 ng/g; Saulekilen-WWTP influent discharge water: 2000 ng/L, Saulekilen-WWTP effluent discharge water: 1600 ng/L; Solumstrand-WWTP influent discharge water: 2500 ng/L, Solumstrand-WWTP effluent discharge water: 1600 ng/L, Solumstrand-WWTP sludge: <19 ng/g, Solumstrand removal was ca. 40%.
Analytical Method and Analytical Details	GC-MS; selected ion monitoring mode (SIM) with electron ionization
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not applicable; Previous measurements of TCEP in wastewater treatment facilities in Japan: influent 540-1200 ng/L, effluent 500-1200 ng/L (Ishikawa et al 1985)

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The WWTP sample source was reported. Analytical standards not reported.
Domain 2: Test Design	Metric 3: Study Controls	N/A	The metric is not applicable to this study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this study type.
Domain 3: Test Conditions			

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Study Citation:	NIVA, (2008). Screening of selected metals and new organic contaminants 2007: Phosphorus flame retardants, polyfluorinated organic compounds, nitro-PAHs, silver, platinum and sucralose in air, wastewater treatment facilities, and freshwater and marine recipients.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	10005023			
Domain	Metric	EVALUATION		Comments
		Rating		
	Metric 5:	Test Method Suitability	N/A	The metric is not applicable to this study type.
	Metric 6:	Testing Conditions	High	Details regarding system operating conditions were reported.
	Metric 7:	Testing Consistency	N/A	The metric is not applicable to this study type.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to this study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Removal rates or removal efficiencies were not reported.
	Metric 12:	Test Substance Purity	High	Detail regarding sampling methods were included.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Limited detail regarding analytical method; detection limits and extraction efficiency not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study.

Overall Quality Determination**Medium**

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Miscellaneous
HERO ID:	6629833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Method Details, Test Condition Details, and Test Consistency	Samples were collected from waste water treatment plants in Spain; Not reported; Not reported
Details	
System Type Design	Not reported
Sampling Frequency and Sampling Details	Not reported; Not reported
Test Temperature	Not reported
Results Details	Median concentration values in influent = 0.30-0.33 µg/L and effluent samples = 0.22 µg/L
Analytical Method and Analytical Details	Not reported; Not reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	N/A	This metric does not apply to this type of study.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	This metric does not apply to this type of study.
	Metric 4: Test Substance Stability	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 6: Testing Conditions	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 7: Testing Consistency	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.

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Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	6629833			
Domain	Metric	EVALUATION Rating	Comments	
	Metric 8:	System Type and Design	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	This metric does not apply to this type of study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 12:	Test Substance Purity	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium	Detail regarding this metric were not limited; however, additional information may be included in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric does not apply to this type of study.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible; however, additional information may be included in the primary source.
	Metric 18:	QSAR Models	N/A	This metric does not apply to this type of study.

Overall Quality Determination**Medium**

* Related References: Rodil R et al; Chemosphere 86: 1040-9 (2012)

Study Citation: NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template: Miscellaneous
HERO ID: 6629833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	Samples were collected from waste water treatment plants in Spain and Norway; Not reported; Not reported
System Type Design	Not reported
Sampling Frequency and Sampling Details	Not reported; Not reported
Test Temperature	Not reported
Results Details	Spain: Concentration in influent = <0.025-0.30 ng/L and effluent samples = <0.025-0.70 ng/L; Norway: Concentration in influent = 2000-2500 ng/L and effluent samples = 1600-2200 ng/L
Analytical Method and Analytical Details	Not reported; Not reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	N/A	This metric does not apply to this type of study.
Domain 2: Test Design	Metric 3: Study Controls	N/A	This metric does not apply to this type of study.
	Metric 4: Test Substance Stability	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 6: Testing Conditions	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 7: Testing Consistency	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 8: System Type and Design	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.

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Domain	Metric	EVALUATION		Comments
		Rating		
Study Citation: NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.				
OECD Harmonized Template: Miscellaneous				
HERO ID: 6629833				
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric does not apply to this type of study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 12:	Test Substance Purity	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Detail regarding this metric were not limited; however, additional information may be included in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric does not apply to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible; however, additional information may be included in the primary source.
	Metric 18:	QSAR Models	N/A	This metric does not apply to this type of study.
Overall Quality Determination			Medium	

* Related References: van der Been I, de Boer J; Chemosphere 88: 1119-53 (2012)

Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.
OECD Harmonized Template:	Miscellaneous
HERO ID:	6629833

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Method Details, Test Condition Details, and Test Consistency	Samples were collected from 11 sewage treatment plants located in Sweden; Concentrations in sludge samples ranged from 0.6-110 ng/g dry weight; Not reported
Details	
System Type Design	Not reported
Sampling Frequency and Sampling Details	Not reported; Not reported
Test Temperature	Not reported
Results Details	Concentration in influent = 90-1000 ng/L and effluent samples = 350-890 ng/L
Analytical Method and Analytical Details	Not reported; Not reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	N/A	This metric does not apply to this type of study.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	This metric does not apply to this type of study.
	Metric 4: Test Substance Stability	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 6: Testing Conditions	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 7: Testing Consistency	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 8: System Type and Design	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.

Domain 4: Test Organisms

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Domain	Metric	EVALUATION		Comments
		Rating		
Study Citation:	NLM, (2020). PubChem database: compound summary: tris(2-chloroethyl) phosphate.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	6629833			
	Metric 9:	Outcome Assessment Methodology	N/A	This metric does not apply to this type of study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 12:	Test Substance Purity	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	Detail regarding this metric were not reported; however, additional information may be included in the primary source.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Detail regarding this metric were not limited; however, additional information may be included in the primary source.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric does not apply to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible; however, additional information may be included in the primary source.
	Metric 18:	QSAR Models	N/A	This metric does not apply to this type of study.
Overall Quality Determination		Medium		

* Related References: Marklund A et al; Environ Sci Technol 39: 7423-9 (2005)

Study Citation:	Oates, R. P., Longley, G., Hamlett, P., Klein, D. (2017). Pharmaceutical and endocrine disruptor compounds in surface and wastewater in San Marcos, Texas. Water Environment Research 89(11):2021-2030.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5469250

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	Grab sample collect, preserved, and extracted. Samples analyzed by single quadrupole high-performance liquid chromatography/tandem mass spectrometry (HPLC-MS/MS); pH adjusted to 2 with concentrated sulfuric acid.; Not Reported
System Type Design	solid-phase extraction (SPE) cartridges (6 mL/200 mg hydrophilic-lipophilic balance (HLB) cartridges, Waters, Milford, Massachusetts).
Sampling Frequency and Sampling Details	Collected from two sewage ports at a hospital in October 2006, January 2007, and March 2007; San Marcos WRRF (central TX) wastewater collection system (0.05–140 g/L concentrations). Grab samples from 7 locations collected at highest flow. Held on ice until stored at 4 C within 2 hrs of collection. Extracted within 7 days of collection.
Test Temperature	Not reported
Results Details	WWRF Influent (µg/L): Mean: 0.26 , Max: 0.59; Hospital (µg/L): Mean: 0.053 , Max: 0.095; TCEP Removal: -19.4% (October), 67.7% (January), 50.8% (March), and 33% (average)
Analytical Method and Analytical Details	2 methods as described in Vanderford et al. 2013 and Kolpin et al. 2012. Quality control plan implemented and described.; At least one field blank and one lab blank; Matrix effects to assessed with on lab-reagent spike and two matrix spikes per sampling event. reagent spike recoveries ranged from 51 to 139% and matrix spike recoveries ranged from 57 to 154%.
Transformation Products, Statistics, and Kinetics	Not reported; WRRF Influent DF%: 100 (n = 3) Hospital DF%: 67 (n =6); Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was measured from field samples and identified using GC-MS.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate blanks were utilized.
	Metric 4: Test Substance Stability	High	The sample storage conditions and preparation were reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	The testing conditions were reported and appropriate.
	Metric 7: Testing Consistency	High	There were no reported differences in the testing conditions between sample groups.

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Study Citation:	Oates, R. P., Longley, G., Hamlett, P., Klein, D. (2017). Pharmaceutical and endocrine disruptor compounds in surface and wastewater in San Marcos, Texas. Water Environment Research 89(11):2021-2030.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5469250			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	Sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	There was a wide variation in the three reported removal rates for TCEP.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The data reporting was appropriate.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	Statistical analysis was not reported but the omission is unlikely to have a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Oppenheimer, J., Stephenson, R., Burbano, A., Liu, L. (2007). Characterizing the passage of personal care products through wastewater treatment processes. Water Environment Research 79(13):2564-2577.
OECD Harmonized Template:	Miscellaneous
HERO ID:	1410400

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; Wastewater; NR; 97% Notes: Standard from Acros (Allentown, PA)
Test Method Details, Test Condition Details, and Test Consistency Details	Municipal treatment facilities; Plant D: municipal with significant industrial component, primary treatment: no chemicals, secondary treatment: nitrification/denitrification, secondary aeration: diffused air, filters: granular MF/RO, disinfection: chlorine; Plant F municipal with light industrial component, primary treatment: none, secondary treatment: extended aeration nitrification/denitrification, secondary aeration: surface air, filters: deep bed, disinfection: UV
System Type Design	Plant D: SRT ca. 7-20 days; Plant F: SRT ca. 20-30 days
Sampling Frequency and Sampling Details	Sampling events in October, November and January; Influent and effluent samples collected.
Test Temperature	Seasonal: 18.9 to 25.8°C
Results Details	Removal from tertiary filters ND, -17%, 12% at plant F; and ND, -100%, ND at plant D; removal from reverse osmosis >65% from plant D
Analytical Method and Analytical Details	Solid phase extraction followed by GC/MS; MDL: 0.179 µg/L
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	The source and purity were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	The metric is not applicable to this type of study.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this type of study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The metric met the criteria for high confidence for this type of study.
	Metric 6: Testing Conditions	High	The metric met the criteria for high confidence for this type of study.
	Metric 7: Testing Consistency	N/A	The metric is not applicable to this type of study.
	Metric 8: System Type and Design	High	The metric met the criteria for high confidence for this type of study.

Domain 4: Test Organisms

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Study Citation:	Oppenheimer, J., Stephenson, R., Burbano, A., Liu, L. (2007). Characterizing the passage of personal care products through wastewater treatment processes. <i>Water Environment Research</i> 79(13):2564-2577.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	1410400			
	EVALUATION			
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The metric met the criteria for high confidence for this type of study.
	Metric 12:	Test Substance Purity	High	The metric met the criteria for high confidence for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The metric met the criteria for high confidence for this type of study.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	N/A	The metric is not applicable to this type of study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this type of study.
Overall Quality Determination			High	

Study Citation:	Padhye, L. P., Yao, H., Kung'u, F. T., Huang, C. H. (2014). Year-long evaluation on the occurrence and fate of pharmaceuticals, personal care products, and endocrine disrupting chemicals in an urban drinking water treatment plant. <i>Water Research</i> 51:266-276.
OECD Harmonized Template:	Miscellaneous
HERO ID:	4253347

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; The test substance was detected in raw water being pumped into a drinking water treatment plant.; NR; NR Notes: Trimethoprim-d3 was used as an internal standard.
Test Method Details, Test Condition Details, and Test Consistency	A drinking water treatment plant in the southeast United States was sampled at multiple points to determine removal efficiency.; Total suspended solids, pH, alkalinity, biological oxygen demands, chemical oxygen demand, turbidity, and phosphorous and ammonia concentrations were all measured.; Not reported
System Type Design	Reported in supplemental information.
Sampling Frequency and Sampling Details	Composite samples were collected twice per season for one year for a total of 8 sampling events.; Samples were collected from the raw water pumping station, reservoir effluent from the junction box, flocculation/sedimentation effluent before ozonation, ozonation effluent before filters, and finished water in the clear well.
Test Temperature	Not reported
Results Details	Occurrence of TCEP in source water: 88% frequency of detection; max concentration 51.7±1.9 ng/L; min concentration 0 ng/L; median concentration 5.6 ng/L. In drinking water: 88% frequency of detection; max concentration 20.4±5.8 ng/L; min concentration 0 ng/L; median concentration 3.7 ng/L. Overall removal efficiency: 55.8±35.4%; RE by pre-ozonation, flocculation, and sedimentation: 40.5±41.9%; RE by intermediate ozonation: 38.9±41.9%; RE by filtration and chlorination: 31.6±34.5%
Analytical Method and Analytical Details	HPLC-MS-MS; Duplicate samples were analyzed. Other analytical details and water quality characterization were provided in supplementary material.
Transformation Products, Statistics, and Kinetics	Not reported; Standard deviations were reported for the removal efficiencies after each reported process.; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was measured in field samples and was identified using an appropriate analytical method.
Domain 2: Test Design	Metric 3: Study Controls	High	Quality control samples were analyzed.
	Metric 4: Test Substance Stability	High	The storage, preparation, and homogeneity of the test samples containing the target chemical were reported.
Domain 3: Test Conditions			

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Study Citation:	Padhye, L. P., Yao, H., Kung'u, F. T., Huang, C. H. (2014). Year-long evaluation on the occurrence and fate of pharmaceuticals, personal care products, and endocrine disrupting chemicals in an urban drinking water treatment plant. <i>Water Research</i> 51:266-276.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	4253347			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	The testing conditions were recorded but were only reported in supplemental materials. The omission is unlikely to have an impact on the study results.
	Metric 7:	Testing Consistency	High	Samples were collected during each season to account for changing conditions.
	Metric 8:	System Type and Design	N/A	The metric is not applicable to the study type.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The sampling methods were reported and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Medium	The standard deviations of the calculated removal efficiencies were reported and may have an impact on the interpretation of the results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The concentrations of the target chemical were not reported for each sampling period but the omissions are unlikely to have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical analysis reported was appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Medium	Because of limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Pang, L., Yang, P. J., Zhao, J. H., Zhang, H. Z. (2016). Comparison of wastewater treatment processes on the removal efficiency of organophosphate esters. <i>Water Science and Technology</i> 74(7):1602-1609.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5166283

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Wastewater samples stored in amber glass bottles at 4°C.; NR
Radiolabel, Source, State, Purity	NA; Wastewater from two WWTPs in Zhengzhou city, China; NA; NA Notes: Analytical standard: Dr. Ehrenstorfer GmbH, Augsburg, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Sewage samples collected from a WWTP in Zhengzhou city, China, the Wangxinzhuang plant, to determine removal efficiency of selected pollutants.; Sewage source: domestic Treatment capacity: 400,000 m ³ /d; TOC: 18%
System Type Design	Influent, bar screens, anaerobic treatment, oxic treatment, secondary clarifier, UV filter, final effluent
Sampling Frequency and Sampling Details	Collected every 4 hours over 24 hours; Samples combined as composite samples, collected at influent, anaerobic treatment, aerobic treatment, secondary clarifier, and effluent.
Test Temperature	Not reported
Results Details	Removal efficiency: 0.3%. Influent: 172.3 ± 2.8 µg/L. Anaerobic: 150.7 ± 3.1 µg/L. Aerobic: 94.4 ± 32.0 µg/L. Secondary clarifier: 100.8 ± 24.2 µg/L. Effluent: 171.8 ± 37.3 µg/L
Analytical Method and Analytical Details	UPLC-MS/MS; LOD 3 ng/L; Sewage samples extracted on Oasis HLB cartridge, eluted with ACN, concentrated under N ₂ , redissolved in ACN/water; recovery 106 ± 5.1%
Transformation Products, Statistics, and Kinetics	Not applicable; Not applicable; Not applicable
Reference Substance and Reference Substance Results	Method blank; 7.5±0.5 µg/L

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The source of the WWTP samples was reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Method blanks were included and the chemical of interest was detected within an acceptable range.
	Metric 4: Test Substance Stability	High	Sample storage and preparation was reported and appropriate.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The WWTP study was appropriate for the test substance.
	Metric 6: Testing Conditions	Medium	WWTP operational stages were reported but no operational parameters (HRT, SRT, temperature).
	Metric 7: Testing Consistency	High	Samples were collected, processed, and analyzed consistently.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation:	Pang, L., Yang, P. J., Zhao, J. H., Zhang, H. Z. (2016). Comparison of wastewater treatment processes on the removal efficiency of organophosphate esters. Water Science and Technology 74(7):1602-1609.		
OECD Harmonized Template:	Miscellaneous		
HERO ID:	5166283		
	Metric 8:	System Type and Design	N/A The metric is not applicable to this study type.
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High The outcome assessment methodology was suitable for removal efficiency determination.
	Metric 12:	Test Substance Purity	Medium Sampling methods were appropriate but seasonal variations were not reflected based on the sampling frequency.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium Sewage samples were filtered and suspended particles were not analyzed; suspended particulate effluent and the chemical of interest sorbed to effluent particulate was not accounted for in removal efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High The analytical method was appropriate. Limits of detection and extraction efficiency were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A Statistical methods were not applied.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium The results were reasonable based on the method and compared to previous studies; however, without operational parameters broader trends in removal efficiency cannot be determined.
	Metric 18:	QSAR Models	N/A The metric is not applicable to this study type.
Overall Quality Determination		High	

Study Citation:	Pang, L., Yang, P. J., Zhao, J. H., Zhang, H. Z. (2016). Comparison of wastewater treatment processes on the removal efficiency of organophosphate esters. Water Science and Technology 74(7):1602-1609.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5166283

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Wastewater samples stored in amber glass bottles at 4°C.; NR
Radiolabel, Source, State, Purity	NA; Wastewater from two WWTPs in Zhengzhou city, China; NA; NA Notes: Analytical standard: Dr. Ehrenstorfer GmbH, Augsburg, Germany
Test Method Details, Test Condition Details, and Test Consistency Details	Sewage samples collected from a WWTP in Zhengzhou city, China, the Matougang plant, to determine removal efficiency of selected pollutants.; Sewage source: domestic Treatment capacity: 600,000 m ³ /d; TOC: 27%
System Type Design	Influent, bar screens, anaerobic treatment, anoxic treatment, oxic treatment, secondary clarifier, UV filter, final effluent
Sampling Frequency and Sampling Details	Collected every 4 hours over 24 hours; Samples combined as composite samples, collected at influent, anaerobic treatment, aerobic treatment, secondary clarifier, and effluent.
Test Temperature	Not reported
Results Details	Removal efficiency: 12.3%. Influent: 70.0 ± 7.5 µg/L. Anaerobic: 49.1 ± 24.7 µg/L. Aerobic: 59.3 ± 21.4 µg/L. Secondary clarifier: 44.2 ± 15.7 µg/L. Effluent: 61.4 ± 6.9 µg/L
Analytical Method and Analytical Details	UPLC-MS/MS; LOD 3 ng/L; Sewage samples extracted on Oasis HLB cartridge, eluted with ACN, concentrated under N ₂ , redissolved in ACN/water; recovery 106 ± 5.1%
Transformation Products, Statistics, and Kinetics	Not applicable; Not applicable; Not applicable
Reference Substance and Reference Substance Results	Method blank; 7.5±0.5 µg/L

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The source of the WWTP samples was reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Method blanks were included and the chemical of interest was detected within an acceptable range.
	Metric 4: Test Substance Stability	High	Sample storage and preparation was reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The WWTP study was appropriate for the test substance.
	Metric 6: Testing Conditions	Medium	WWTP operational stages were reported but no operational parameters (HRT, SRT, temperature).
	Metric 7: Testing Consistency	High	Samples were collected, processed, and analyzed consistently.
	Metric 8: System Type and Design	N/A	The metric is not applicable to this study type.

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Domain	Metric	EVALUATION		Comments
		Rating		
Study Citation: Pang, L., Yang, P. J., Zhao, J. H., Zhang, H. Z. (2016). Comparison of wastewater treatment processes on the removal efficiency of organophosphate esters. Water Science and Technology 74(7):1602-1609.				
OECD Harmonized Template: Miscellaneous				
HERO ID: 5166283				
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was suitable for removal efficiency determination.
	Metric 12:	Test Substance Purity	Medium	Sampling methods were appropriate but seasonal variations were not reflected based on the sampling frequency.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	Medium	Sewage samples were filtered and suspended particles were not analyzed; suspended particulate effluent and the chemical of interest sorbed to effluent particulate was not accounted for in removal efficiency.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High	The analytical method was appropriate. Limits of detection and extraction efficiency were reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	Statistical methods were not applied.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	Medium	The results were reasonable based on the method and compared to previous studies; however, without operational parameters broader trends in removal efficiency cannot be determined.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Propp, V. R., De Silva, A. O., Spencer, C., Brown, S. J., Catingan, S. D., Smith, J. E., Roy, J. W. (2021). Organic contaminants of emerging concern in leachate of historic municipal landfills. Environmental Pollution 276:116474.
OECD Harmonized Template:	Miscellaneous
HERO ID:	10228644

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; tris(2-chloroethyl)phosphate
Confidentiality, Type, Guideline	no; monitoring; monitoring
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; groundwater samples; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	48 leachate-impacted groundwater samples collected from 20 closed landfills.; municipal solid waste landfills from across Ontario, Canada, in operation from the 1920s to the 1990s.; Not Reported
System Type Design	Not Reported
Sampling Frequency and Sampling Details	sampling was carried out May-December 2018; details available supplemental data - Field parameters measured with hand-held probes prior to collecting each sample. Samples were filtered and preserved in the field and stored in ice or in a fridge prior to analysis.
Test Temperature	not reported; measurements described in supplemental data.
Results Details	highest detected concentration 2.9 ug/L
Analytical Method and Analytical Details	details available in supplemental data - extraction using SPE and UHPLC-MS/MS instrumental analysis citing Sun et al. 2020; Not Reported
Transformation Products, Statistics, and Kinetics	not applicable; supplemental data - reported the 48 individual sample concentrations; not applicable
Reference Substance and Reference Substance Results	not applicable; Not Reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	High	The leachate-impacted sample source was reported. Analytical standards reported in supplemental data.
Domain 2: Test Design	Metric 3: Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to this study type.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	N/A	The metric is not applicable to this study type.
	Metric 6: Testing Conditions	Medium	Limited details regarding test conditions were included.
	Metric 7: Testing Consistency	Medium	Limited details regarding test conditions were included.
	Metric 8: System Type and Design	High	Field studies are expected to be at equilibrium.
Domain 4: Test Organisms			

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Study Citation:	Propp, V. R., De Silva, A. O., Spencer, C., Brown, S. J., Catingan, S. D., Smith, J. E., Roy, J. W. (2021). Organic contaminants of emerging concern in leachate of historic municipal landfills. Environmental Pollution 276:116474.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	10228644			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	The assessment methodology did not address or report an outcome of interest; however, this study suggests chemical of interest may undergo groundwater transport.
	Metric 12:	Test Substance Purity	Medium	Details regarding sampling methods of the outcome(s) were not fully reported in the supplemental data.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	Sufficient evidence wasn't presented to confirm that parent compound disappearance was not likely due to some other process. Analytical method details for the groundwater monitoring data were available in supplemental data files.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Due to limited information, evaluation of the reasonableness of the study results was not possible.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study.
Overall Quality Determination		Medium		

Study Citation:	Qi, C., Yu, G., Zhong, M., Peng, G., Huang, J., Wang, B. (2019). Organophosphate flame retardants in leachates from six municipal landfills across China. Chemosphere 218:836-844.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5043402

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	none; monitoring study; monitoring study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	TCEP-d12 (Cambridge Isotope Laboratories (Tewksbury, USA); analytical standard: Chiron AS (Trondheim, Norway); Samples of raw and final leachates from municipal landfill sites; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency	Raw and final leachates sampled from 6 municipal landfill sites from 6 provincial capital cities in 5 regions, Northeast, North, Central, Southwest, and South China were used to estimate aqueous removal efficiencies in a leachate treatment plant.; Daily discharge capacity of plant = 1800 tonnes of final leachate.; Not reported
System Type Design	Plant operations included: a membrane bioreactor (MBR), a nanofiltration (NF) unit, and a reverse osmosis (RO) process.
Sampling Frequency and Sampling Details	Not reported; Triplicate samples collected.
Test Temperature	Not reported
Results Details	Raw leachate detection frequency = 100% with a mean value of 90.9 µg/L, median = 33.5 µg/L, range 14.0-385 µg/L. Final leachate detection frequency = 100% with a mean value of 7.69 µg/L, median 3.51 µg/L, range 0.120-30.6 µg/L. Removal efficiencies across the treatment plants ranged from ca. 50-100% with an average of 91.5%. Additional information is cited to supplemental document.
Analytical Method and Analytical Details	HPLC; Not reported; may be in supplemental document
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified clearly.
	Metric 2: Test Substance Purity	High	The source was reported.
Domain 2: Test Design	Metric 3: Study Controls	N/A	The metric is not applicable to the study type.
	Metric 4: Test Substance Stability	N/A	The metric is not applicable to the study type.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	N/A	The metric is not applicable to the study type.
	Metric 6: Testing Conditions	Medium	Some testing conditions/treatment plant operational parameters were omitted; additional detail may be found in supporting document.
	Metric 7: Testing Consistency	N/A	The metric is not applicable to the study type.
	Metric 8: System Type and Design	N/A	The metric is not applicable to the study type.

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Study Citation:	Qi, C., Yu, G., Zhong, M., Peng, G., Huang, J., Wang, B. (2019). Organophosphate flame retardants in leachates from six municipal landfills across China. Chemosphere 218:836-844.		
OECD Harmonized Template:	Miscellaneous		
HERO ID:	5043402		
Domain	Metric	EVALUATION	
		Rating	Comments
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to the study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High Sampling was appropriate.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	N/A The metric is not applicable to the study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to the study.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium Analytical detail was generalized; additional detail may be found in supporting document.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A The metric is not applicable to the study.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High The study results were reasonable.
	Metric 18:	QSAR Models	N/A The metric is not applicable to the study type.
Overall Quality Determination		High	

Study Citation:	Stephenson, R. (2007). Fate of pharmaceuticals and personal care products through wastewater treatment processes.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5919305

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; full-scale and pilot-scale WWTP removal efficiency; Experimental; full-scale and pilot-scale WWTP removal efficiency
Solvent, Reactivity, Storage, Stability	NA; NR; Refrigerated; NR
Radiolabel, Source, State, Purity	NA; WWTPs in southwestern United States; Liquid; NA
Test Method Details, Test Condition Details, and Test Consistency Details	Several wastewater treatment plants in the southwestern United States were monitored to determine aqueous test substance removal efficiency.; Facility A: polymer ferric primary treatment, high purity O2 activated sludge secondary treatment, SRT = 0.5 - 1.5 days, no filters, no disinfection; Facility B: no chemical primary treatment, modified Ludzack Ettinger process with nitrification/denitrification secondary treatment, SRT = 3-5 days, deep bed filter, chlorine disinfection; Facility C: no chemical primary treatment, activated sludge secondary treatment, SRT = 4-6 days, deep bed filters, UV disinfection; Facility D: no chemical primary treatment, nitrification/denitrification secondary treatment, SRT = 7-20 days, granular microfiltration/reverse-osmosis filters, chlorine disinfection; Facility E: no primary treatment, nitrification/denitrification secondary treatment, SRT = 11-16, no filters, UV disinfection; Facility F: no primary treatment, nitrification/denitrification, SRT = 20-30 days, deep bed filters, UV disinfection; MBR 1 (located at facility E): nitrification/denitrification, SRT = 14 days; MBR 2 : SRT = 15 days; Not Reported
System Type Design	Not Reported
Sampling Frequency and Sampling Details	3 sampling campaigns for most facilities; Samples collected as 24-h time-weighted composites. Samples collected in summer and winter months.
Test Temperature	NR
Results Details	Infrequently detected, poor removal. SRT 80% => 30 days, Percent removal Facility A: ND, ND, ND Facility B: NA (effluent > influent, could not calculate removal efficiency), 3%, 6% Facility C: ND, NA, ND Facility D: ND, NA, ND Facility E: ND, ND Facility F: 50%, NA, ND MBR 1 (located at facility E): ND, ND, ND MBR 2 : ND, ND
Analytical Method and Analytical Details	GC/MS in selective ion monitoring mode; detection limit: 0.179 ug/mL; Samples extracted by SPE, eluted with acetone, dried over Na2SO4.
Transformation Products, Statistics, and Kinetics	NA; Student's t test to determine SRT 80%; NA
Reference Substance and Reference Substance Results	Field blanks; Below the detection limit

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	Medium	The WWTPs monitored in the study were reported generally.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Field blanks were included and were within an acceptable range.
	Metric 4: Test Substance Stability	Medium	Sample storage conditions were reported generally.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was appropriate for the test substance.
	Metric 6: Testing Conditions	High	WWTP operational stages and conditions were reported.

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Study Citation:	Stephenson, R. (2007). Fate of pharmaceuticals and personal care products through wastewater treatment processes.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5919305			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 7:	Testing Consistency	High	Samples were collected and analyzed consistently.
	Metric 8:	System Type and Design	N/A	This metric is not applicable to this type of study.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	This metric is not applicable to this type of study.
	Metric 10:	Sampling Methods	N/A	This metric is not applicable to this type of study.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining waste water treatment removal.
	Metric 12:	Test Substance Purity	High	Sampling methods were described and appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty and variability were discussed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	This metric is not applicable to this type of study.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was reported and appropriate; limits of detection and raw data was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods for determining SRT 80% were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination		High		

Study Citation:	Trapp, S., Eggen, T. (2013). Simulation of the plant uptake of organophosphates and other emerging pollutants for greenhouse experiments and field conditions. <i>Environmental Science and Pollution Research</i> 20(6):4018-4029.
OECD Harmonized Template:	Miscellaneous
HERO ID:	2557394

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; NR; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	Agricultural soil (loamy sand, O: 0.7%, pH 5.4) was spiked with TCEP and sown with carrot or barley seeds for the greenhouse study. A field study with sewage sludge application was also performed to measure uptake into carrot and barley plants.; Pots were irrigated with fertilizer (pH 7.4, EC 1.5 mS cm ⁻¹) and kept at 20 C during the day (16h) and 14 C at night.; Test organisms: Barley (<i>Hordeum vulgare</i> cv. Edel) and carrot (<i>Daucus carota</i> cvs. Napoli, Amagaer, Rothild, and Nutri Red).
System Type Design	Not reported
Sampling Frequency and Sampling Details	The field simulation was monitored for 11 months.; Not reported
Test Temperature	Greenhouse experiment: 20°C day/14°C.
Results Details	In greenhouse study, BCF in carrot leaves was 50, BCF in carrot roots was >1. In the field simulation, sludge accounted for 99.7% of TCEP concentration in soil immediately after application but after 11 months, 100, 77.1, 51.9, and 27.0% of the TCEP concentration in soil, roots, leaves, and seeds, respectively, had originated from the air.
Analytical Method and Analytical Details	Not reported; Not reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION				
Domain	Metric		Rating	Comments
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2:	Test Substance Purity	Medium	The test substance purity was not reported but the omission is unlikely to have a substantial impact on the study results.
Domain 2: Test Design				
	Metric 3:	Study Controls	High	Controls were used without vegetation to determine degradation rates.
	Metric 4:	Test Substance Stability	Medium	The test substance preparation and storage conditions were not reported but the omissions are unlikely to have a substantial impact on the study results.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6:	Testing Conditions	Medium	Some details regarding the testing conditions were not reported but the omissions are unlikely to have a substantial impact on the study results.

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Study Citation:	Trapp, S., Eggen, T. (2013). Simulation of the plant uptake of organophosphates and other emerging pollutants for greenhouse experiments and field conditions. Environmental Science and Pollution Research 20(6):4018-4029.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	2557394			
Domain	Metric	EVALUATION		Comments
	Metric 7:	Testing Consistency	Medium	Differences among study groups were not reported; however, there was no indication of the number of groups tested. The field simulation was monitored from 6-11 months.
	Metric 8:	System Type and Design	High	
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	High	The test organisms used were clearly reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Low	The sampling methods were not clearly reported which may have an impact on the study results.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	Low	Uncertainty in the study results was not reported which may have a substantial impact on the study results.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Low	Some details regarding the analytical method were not reported which may have a substantial impact on the study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium	There was minimal statistical analysis reported but the omission is unlikely to have a substantial impact on the study results.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.

Overall Quality Determination**Medium**

Study Citation:	Wan, W. N., Huang, H. L., Lv, J. T., Han, R. X., Zhang, S. Z. (2017). Uptake, translocation, and biotransformation of organophosphorus esters in wheat (<i>triticum aestivum</i> l.). <i>Environmental Science and Technology</i> 51(23):13649-13658.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5166841

EXTRACTION

Parameter	Data
CASRN and Test Material	Not Reported; triethyl-chloro-phosphate
Confidentiality, Type, Guideline	No; experimental; experimental
Solvent, Reactivity, Storage, Stability	methanol (volume in exposure solution <1% v/v); NR; Using autoclaved 150 mL glass-stoppered flasks (wrapped to prevent photolysis) 76.2±1.5 µg/L TCEP in methanol was added to sterile nutrient solution.; NR
Radiolabel, Source, State, Purity	NR; Wellington Laboratories, Inc. (Guelph, Ontario, Canada); solid prepared in solution; >97% Notes: TCEP
Test Method Details, Test Condition Details, and Test Consistency Details	Uptake, translocation and biotransformation in wheat (<i>Triticum aestivum</i> L.) from Chinese Academy of Agricultural Sciences, Beijing, China. Germinated wheat seedlings in were grown hydroponically with exposure to test solutions (120 mL) for 240 h.; pH adjusted to 6.5; light intensity for 14h photoperiod = 250 µmol/m sec; relative humidity = 70%; triplicate runs performed;; unplanted, untreated and root exudate controls were included
System Type Design	Not Reported
Sampling Frequency and Sampling Details	12, 24, 36, 48, 72, 96, 144, 192, and 240 h; Root samples were rinsed (rinse water collected); samples were freeze-dried chopped and stored at -20 °C, roots and shoots were analyzed separately; solution samples analyzed immediately.
Test Temperature	day/night = 22/20 °C
Results Details	TCEP in roots at 12 hours was 1.5 µg/g dw, peaked at 3.5 µg/g dw (72h) and decreased to ca. 1.0 µg/g dw after 240 hours. TCEP in shoots at 12 hours was ca. 0.8 µg/g dw, peaked at 1.9 µg/g dw (72h), and decreased to ca. 0.4 µg/g dw after 240 hours. BCEP in roots at 12 hours was ca. 0.5 µg/g dw and increased to ca. 1.6 µg/g dw after 240 hours. BCEP in shoots at 12 hours was ca. 0.1 µg/g dw and increased to ca. 0.75 µg/g dw after 240 hours.
Analytical Method and Analytical Details	Analytes separated using an HP-5MS column and quantified by MS operating in selective ion mode with EI ionization.; LOD 0.06 ng/g (plants), 1.2 ng/L (solutions); recoveries for target chemical: 84.7% (plants), 94.2% (solutions), recoveries for metabolites: 75.1% (plants), 90.1% (solutions); , recoveries for standard: 79.7-89.6%
Transformation Products, Statistics, and Kinetics	TCEP Accumulation in Solution(54.8±3.2%) Root(5.11±0.4%) Shoot(6.02±0.3%) after 240 hours; metabolism to di-ester in Solution(2.87±0.7%) Root(6.91±0.4%) Shoot(7.69±0.3%); recovery after 240 hours = 83.5±3.7%; intra-day and inter-day RSD values were below 10%; not reported
Reference Substance and Reference Substance Results	No reference substance; controls included; Control results indicated contribution from foliar uptake to the accumulation in shoots was negligible

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified.
	Metric 2: Test Substance Purity	High	The source and purity of the test substance were reported.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Controls were included.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported.
Domain 3: Test Conditions			

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Study Citation:	Wan, W. N., Huang, H. L., Lv, J. T., Han, R. X., Zhang, S. Z. (2017). Uptake, translocation, and biotransformation of organophosphorus esters in wheat (<i>triticum aestivum</i> L.). <i>Environmental Science and Technology</i> 51(23):13649-13658.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5166841			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The test method was suitable for the test substance
	Metric 6:	Testing Conditions	High	Testing conditions were reported.
	Metric 7:	Testing Consistency	High	Test conditions were consistent.
	Metric 8:	System Type and Design	Medium	Equilibrium was not reported but this was not likely to have a substantial impact on study results.OR
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed or reported the intended outcome of interest.
	Metric 12:	Test Substance Purity	High	The study reported the use of sampling methods that address the outcome.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Sources of variability in the measurements were considered and accounted for in data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	Data reported was acceptable; supporting document available.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Methods were appropriate.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The study results were reasonable.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination			High	

Study Citation:	Wang, J., Tian, Z., Huo, Y., Yang, M., Zheng, X., Zhang, Y. (2018). Monitoring of 943 organic micropollutants in wastewater from municipal wastewater treatment plants with secondary and advanced treatment processes. <i>Journal of Environmental Sciences</i> 67:309-317.
OECD Harmonized Template:	Miscellaneous
HERO ID:	4728619

EXTRACTION	
Parameter	Data
CASRN and Test Material	not reported; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	none; monitoring study; monitoring study
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	NR; wastewater; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	From 7 full-scale WWTPs in China 32 wastewater samples were collected: influents of secondary treatments, secondary effluents and final effluents.; Wastewater treatment processes included coagulation/sedimentation, continuous microfiltration, submerged ultrafiltration, reverse osmosis filtration, and coagulation/sedimentation-sand filtration. Secondary treatments processes consist of an Anaerobic/Anoxic/Aerobic (A2/O) process, an A2/O + filter process, an oxidation ditch (OD) process and a membrane bioreactor (MBR) process. Hydraulic retention times ranged from 9-20 hours for the biological stage and the sludge retention times from 12-30 days. Secondary effluents were fed into advanced treatment processes included coagulation/sedimentation-sand filtration (CS-SF), cloth-media filtration, reverse osmosis (RO), ozonation and ultraviolet (UV) disinfection-based processes.; 7 full-scale WWTPs in China
System Type Design	full-scale waste water treatment plants in Beijing, Tianjin and Wuxi in China
Sampling Frequency and Sampling Details	not applicable; Samples kept in dark, cooled with ice-packs during transport, water samples stored at 4°C for a maximum of 48 hr prior to analysis.
Test Temperature	not reported
Results Details	TCEP was detected in over 80% of influents or secondary effluents or final effluent; Log10 Concentrations (µg/L) detected in influent ranged from 0.4-0.9; secondary effluent 0.4-1.5; final effluent 0.3-1.0 (values estimated from box-plots). TCEP present in over 75% of effluent samples after advanced treatment, with a mean concentration = 0.52±0.36 µg/L.
Analytical Method and Analytical Details	GC-MS coupled with an automated identification and quantification system with a database; MDLs: less than or equal to 10 up to 100 ng/L (more specific info may be found in supporting documents); average recovery rates for surrogate standards = 80-120%
Transformation Products, Statistics, and Kinetics	not reported; not reported; not reported
Reference Substance and Reference Substance Results	not reported; not reported

EVALUATION				
Domain	Metric	Rating	Comments	
Domain 1: Test Substance				
	Metric 1:	Test Substance Identity	High	The test substance was identified definitively.
	Metric 2:	Test Substance Purity	Medium	Limited source information but this is not likely to affect the interpretation of the results.
Domain 2: Test Design				
	Metric 3:	Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4:	Test Substance Stability	N/A	The metric is not applicable to this type of study.
Domain 3: Test Conditions				
	Metric 5:	Test Method Suitability	High	The WWTP study was appropriate for the test substance.

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Domain	Metric	EVALUATION Rating	Comments	
Study Citation:	Wang, J., Tian, Z., Huo, Y., Yang, M., Zheng, X., Zhang, Y. (2018). Monitoring of 943 organic micropollutants in wastewater from municipal wastewater treatment plants with secondary and advanced treatment processes. Journal of Environmental Sciences 67:309-317.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	4728619			
	Metric 6:	Testing Conditions	High	General WWTP operational stages and operational parameters (HRT, SRT) reported. Seven plants evaluated; data was generalized. More detail may be found in supporting documents.
	Metric 7:	Testing Consistency	Medium	
	Metric 8:	System Type and Design	High	
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	Low	Removal efficiencies were not reported; detail may be in supporting documents.
	Metric 12:	Test Substance Purity	High	Sampling was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	N/A	The metric is not applicable to this study type.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method was appropriate; limits of detection and extraction efficiency were reported; however, specific detail in supporting documents.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	This metric is not applicable to this type of study.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	Low	Specific removal rates were not reported.
	Metric 18:	QSAR Models	N/A	This metric is not applicable to this type of study.
Overall Quality Determination			Medium	

Study Citation:	Wang, Y., Li, Z., Tan, F., Xu, Y., Zhao, H., Chen, J. (2020). Occurrence and air-soil exchange of organophosphate flame retardants in the air and soil of Dalian, China. Environmental Pollution 265 Pt. A(Pt A):114850.
OECD Harmonized Template:	Miscellaneous
HERO ID:	7276605

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Analytical standard: tris (2-chloroethyl) phosphate-d12 (TCEP-d12); field samples from coastal area of Dalian, China; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	surface soil and air samples were analyzed for test material and used to evaluate air-soil exchange trends - Fugacity fraction (ff); Fugacity fraction (ff) calculated based on concentrations in air (Ca) and soil (Cs), air temperature, the gas constant, the fraction of soil organic matter and the octanol-air partition coefficient; ff = 0.5 indicates the chemical is in theoretical equilibrium between air and soil; taking into account variables and uncertainties an ff in the range of 0.25 to 0.75 is considered equilibrium
System Type Design	field monitoring
Sampling Frequency and Sampling Details	samples collected over 40 days: July 30-September 8, 2017; 49 sample events were analyzed for ff
Test Temperature	detail in supporting information
Results Details	Air-soil fugacity fractions (ff) median: 0.685, range 0.307 to 0.986; data indicated TCEP was in equilibrium in suburban and rural areas and tends to volatilize in the urban areas
Analytical Method and Analytical Details	GC-MS/EI; MDL: air 0.40-69.8 pg/m3, soil 0.66-167 pg/g (range is for all OPEs analyzed and not specific to TCEP); recovery in air and soil: 80.9±18.7% and 88.3±11.5%, respectively; results corrected for blank recoveries only.
Transformation Products, Statistics, and Kinetics	Not applicable; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2: Test Substance Purity	High	The test substance was compared to an analytical standard.
Domain 2: Test Design	Metric 3: Study Controls	N/A	This metric is not applicable to this type of study.
	Metric 4: Test Substance Stability	N/A	This metric is not applicable to this type of study.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	Medium	This metric met the criteria for medium confidence as expected for this type of study; detail in supporting information.
	Metric 7: Testing Consistency	N/A	This metric is not applicable to this type of study.
	Metric 8: System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Wang, Y., Li, Z., Tan, F., Xu, Y., Zhao, H., Chen, J. (2020). Occurrence and air-soil exchange of organophosphate flame retardants in the air and soil of Dalian, China. Environmental Pollution 265 Pt. A(Pt A):114850.		
OECD Harmonized Template:	Miscellaneous		
HERO ID:	7276605		
Domain	Metric	EVALUATION	
		Rating	Comments
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A The metric is not applicable to this study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	High This metric met the criteria for high confidence as expected for this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	Medium This metric met the criteria for medium confidence as expected for this type of study; specific concentrations and exact numerical values for the outcome were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A The metric is not applicable to this study type.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A The metric is not applicable to this study type.
Overall Quality Determination		High	

Study Citation:	Wang, Y., Wu, X., Zhang, Q., Zhao, H., Hou, M., Xie, Q., Chen, J. (2018). Occurrence, distribution, and air-water exchange of organophosphorus flame retardants in a typical coastal area of China. Chemosphere 211:335-344.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5469215

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Field study, air-water interphase flux; Field study, air-water interphase flux
Solvent, Reactivity, Storage, Stability	NA; NR; NR; NR
Radiolabel, Source, State, Purity	NA; Coastal area of Dalian, China.; Aqueous and gaseous samples; NA
Test Method Details, Test Condition Details, and Test Consistency	Surface water and passive air samples were collected from sampling sites at the coastal area of Dalian, China. Pollutants of interest were quantified and air-water interphase flux was determined.; Field study.; NA
Details	
System Type Design	Field study
Sampling Frequency and Sampling Details	4x at 12 sites SEpt 24th - Dec 6th, 2016, April 6th and July 13th, 2017 (water); 10 sites for 40 days (air); Surface water samples: collected at ~ 0.5 m depth Water samples passed through glass fiber filter prior to analysis. Passive air samples: collected with PUF disks hung in a tree canopy at ~ 3 m height above ground. Passive air sampling rate: 4 m ³ /d
Test Temperature	NR
Results Details	Mean emission flux: 1414 ± 2093 ng/m ² d; net water-to-air emission: 1403 ± 2094 ng/m ² d; Annual volatilization losses: 133 ± 199 kg/y
Analytical Method and Analytical Details	GC-MS in electron ionization impact source; detection limits: 1.05 - 28.5 pg/m ³ (air), 0.18 - 4.75 ng/L (water); Aqueous samples liquid-liquid extracted 4x with DCM; Air sample PUFs extracted by ASE with DCN/hexane for 2 cycles; extraction recovery: 86.7±18.5% (air), 86.3 ± 25.1% (water), results were blank corrected but not recovery efficiency corrected.
Transformation Products, Statistics, and Kinetics	NA; NR; Net air-water exchange flux = [k _{ol} (C _w - C _a RT/H)] - [V _d *C _p] Where k _{ol} = overall mass transfer coefficient H = Henry's law constant V _d = atmospheric particle deposition velocity C _p = particulate concentrations
Reference Substance and Reference Substance Results	Field blanks; Not detected

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by name.
	Metric 2: Test Substance Purity	N/A	Not applicable for field studies.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	Not applicable for field studies.
	Metric 4: Test Substance Stability	Medium	Sample storage was not reported, preparation was reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	N/A	Not applicable for field studies.
	Metric 6: Testing Conditions	Medium	No environmental conditions were reported.
	Metric 7: Testing Consistency	N/A	Not applicable for field studies.

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Study Citation:	Wang, Y., Wu, X., Zhang, Q., Zhao, H., Hou, M., Xie, Q., Chen, J. (2018). Occurrence, distribution, and air-water exchange of organophosphorus flame retardants in a typical coastal area of China. Chemosphere 211:335-344.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	5469215			
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 8:	System Type and Design	N/A	Not applicable, field studies assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	Not applicable.
	Metric 10:	Sampling Methods	N/A	Not applicable.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment methodology was appropriate for determining air-water flux.
	Metric 12:	Test Substance Purity	High	The sampling methods were appropriate and frequency was appropriate.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	Uncertainty and variability were explicitly addressed.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	Not applicable.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	The analytical method, extraction efficiency, and limits of detection were appropriate. Raw data was reported graphically but may have been reported in tabular form in the supplemental material.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Kinetic calculations were described in depth and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method and detected concentrations were comparable to other field campaigns.
	Metric 18:	QSAR Models	N/A	Not applicable.
Overall Quality Determination			High	

Study Citation:	Yadav, I. C., Devi, N. L., Li, J., Zhang, G. (2018). Organophosphate ester flame retardants in Nepalese soil: Spatial distribution, source apportionment and air-soil exchange assessment. Chemosphere 190:114-123.
OECD Harmonized Template:	Miscellaneous
HERO ID:	4550202

EXTRACTION	
Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Estimated; Estimated
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Surrogate standard: TCEP-d12; NR; NR; NR Notes: NR
Test Method Details, Test Condition Details, and Test Consistency Details	Fugacity in soil, $f(s) = C(s)[RT]/0.41[FOM]Koa$; where $C(s)$ is the concentration in soil (mol/m ³), R is the universal gas constant, T is the mean daily temperature, FOM is the fraction organic matter, and Koa is the octanol-air partitioning coefficient. Fugacity in air, $f(a) = C(air)[RT]$; where $C(air)$ is the concentration of TCEP in air (mol/m ³). Fugacity fraction, $ff = f(s)/[f(s) + f(a)]$; NR; NR
System Type Design	NR
Sampling Frequency and Sampling Details	NR; Soil concentrations were measured at 4 cities in Nepal: Kathmandu, Pokhara, Birgunj, and Biratnagar. 50g of surface soil samples were collected from 7 locations in each city. Samples were freeze dried, ground to powder, and sieved through 500um sieve and stored at -20°C until analysis. Air concentrations were obtained from passive air sampling of each city in previous studies.
Test Temperature	NR
Results Details	Fugacity fraction: >0.99 at all locations (estimated from graph). ff above 0.5 indicates net volatilization
Analytical Method and Analytical Details	GC-EI-MS; Agilent GC 7890A with 7000A Triple quadrupole coupled MSD.
Transformation Products, Statistics, and Kinetics	NR; NR; NR
Reference Substance and Reference Substance Results	NR; NR

EVALUATION			
Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified using common nomenclature.
	Metric 2: Test Substance Purity	High	The test substance was identity was verified using appropriate analytical means.
Domain 2: Test Design			
	Metric 3: Study Controls	High	Appropriate laboratory blanks were taken through all procedures.
	Metric 4: Test Substance Stability	High	The test substance preparation and storage conditions were reported and appropriate.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	High	The soil characteristics were reported.
	Metric 7: Testing Consistency	High	There were no reported deviations in the testing conditions across study groups.
	Metric 8: System Type and Design	High	Soil samples were collected over several months.

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Study Citation:	Yadav, I. C., Devi, N. L., Li, J., Zhang, G. (2018). Organophosphate ester flame retardants in Nepalese soil: Spatial distribution, source apportionment and air-soil exchange assessment. Chemosphere 190:114-123.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	4550202			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to the study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to the study type.
Domain 5: Outcome Assessment	Metric 11:	Test Substance Identity	High	The outcome assessment methodology addressed the intended outcome of interest.
	Metric 12:	Test Substance Purity	Medium	Air sampling details were not reported; however, the omission is unlikely to have a substantial impact on the study results.
Domain 6: Confounding/Variable Control	Metric 13:	Confounding Variables	High	Sources of uncertainty were considered and accounted for in the data evaluation.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to the study type.
Domain 7: Data Presentation and Analysis	Metric 15:	Data Reporting	High	Analytical methods used were suitable for detection and quantification of the target chemical.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	The statistical methods were reported and appropriate.
Domain 8: Other	Metric 17:	Verification or Plausibility of Results	High	The study results are reasonable and were consistent with previous studies.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to the study type.
Overall Quality Determination		High		

Study Citation:	Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.
OECD Harmonized Template:	Miscellaneous
HERO ID:	8682618

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	No; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	Not reported; Not reported; Not reported; Not reported
Radiolabel, Source, State, Purity	Not reported; Balinway Chemical Reagent Co., Ltd. (China); Not reported; Not reported; referred to as standard substances
Test Method Details, Test Condition Details, and Test Consistency Details	3 L wash bottle with 1.5 L of deionized water and 1 mg/L of 9 organophosphate esters (OPE), was connected to an aeration device with a flow rate of 500 ml/min. The aeration device was connected to a wash bottle with methanol to absorb the volatilized OPE.; Not reported; Not reported
System Type Design	Not reported
Sampling Frequency and Sampling Details	7 times per figure 1 of report; Not reported
Test Temperature	Not reported
Results Details	volatilization: 0% at 120 hours for alkyl and chlorinated OPE (reported as 'almost non-volatile')
Analytical Method and Analytical Details	GC-MS/MS (Thermo Fisher Scientific, Waltham, MA, United States); Not Reported
Transformation Products, Statistics, and Kinetics	Not reported; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The test substance was identified definitively.
	Metric 2: Test Substance Purity	High	The source of the test substance was reported and verified by analytical means (GC-MS/MS).
Domain 2: Test Design	Metric 3: Study Controls	N/A	The study did not require concurrent control groups.
	Metric 4: Test Substance Stability	Medium	The test substance stability, homogeneity, preparation or storage conditions were not reported; however, these factors were not likely to influence the test substance or were not likely to have a substantial impact on study results.
Domain 3: Test Conditions	Metric 5: Test Method Suitability	High	The test method was suitable for the test substance.
	Metric 6: Testing Conditions	Medium	There were reported deviations or omissions in testing conditions (e.g., temperature was not reported); however, sufficient data were reported to determine that the deviations and omissions were not likely to have a substantial impact on study results.
	Metric 7: Testing Consistency	High	Test conditions were consistent across samples or study groups.

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Domain	Metric	EVALUATION Rating	Comments
Study Citation: Yang, X., Fan, D., Gu, W., Liu, J., Shi, L., Zhang, Z., Zhou, L., Ji, G. (2021). Aerobic and anaerobic biodegradability of organophosphates in activated sludge derived from kitchen garbage biomass and agricultural residues. <i>Frontiers in Bioengineering and Biotechnology</i> 9:649049.			
OECD Harmonized Template: Miscellaneous			
HERO ID: 8682618			
	Metric 8:	System Type and Design	Medium Equilibrium was not established or reported but this was not likely to have a substantial impact on study results.
Domain 4: Test Organisms			
	Metric 9:	Outcome Assessment Methodology	N/A This metric does not apply to this study type.
	Metric 10:	Sampling Methods	N/A This metric does not apply to this study type.
Domain 5: Outcome Assessment			
	Metric 11:	Test Substance Identity	High The outcome assessment methodology addressed or reported the intended outcome(s) of interest.
	Metric 12:	Test Substance Purity	Medium Sampling details were not reported; however, the limitations were not likely to have a substantial impact on results.
Domain 6: Confounding/Variable Control			
	Metric 13:	Confounding Variables	Medium Sources of variability and uncertainty in the measurements and statistical techniques and between study groups were reported in the study but not evaluated.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A This metric does not apply to this study type.
Domain 7: Data Presentation and Analysis			
	Metric 15:	Data Reporting	Medium The target chemical and transformation product(s) concentrations, extraction efficiency, percent recovery, or mass balance were not reported; however, these omissions were not likely to have a substantial impact on study results.
	Metric 16:	Statistical Methods and Kinetic Calculations	Medium No statistical analyses were conducted; however, sufficient data were provided to conduct an independent statistical analysis
Domain 8: Other			
	Metric 17:	Verification or Plausibility of Results	Low The study results were reasonable but not quantitative; also reported for a group of chemicals.
	Metric 18:	QSAR Models	N/A A QSAR model was not reported.
Overall Quality Determination		Medium	

Study Citation:	Zhang, L., Wang, Y., Tan, F., Yang, Y., Wu, X., Wang, W., Liu, D. (2020). Tidal variability of polycyclic aromatic hydrocarbons and organophosphate esters in the coastal seawater of Dalian, China. Science of the Total Environment 708:134441.
OECD Harmonized Template:	Miscellaneous
HERO ID:	6866245

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; Tris(2-chloroethyl) phosphate
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NR; NR; NR; NR
Radiolabel, Source, State, Purity	Analytical standard: tris (2-chloroethyl) phosphate-d12 (TCEP-d12); field samples from coastal area of Dalian, China; NR; NR
Test Method Details, Test Condition Details, and Test Consistency Details	seawater and air samples were analyzed for test material and used to evaluate air-water exchange trends - Fugacity fraction (ff); Fugacity fraction (ff) calculated based on concentrations in air (Ca) and water (Cw), air temperature, the gas constant, and a temperature corrected HLC; ff = 0.5 indicates the chemical is in theoretical equilibrium between air and water; taking into account variables and uncertainties an ff is the range of 0.26 to 0.74 is considered equilibrium
System Type Design	field monitoring
Sampling Frequency and Sampling Details	Ca. every 3 hrs over a 48 hour period; 17 sample events were analyzed for ff
Test Temperature	detail in supporting information
Results Details	Air-water fugacity fractions (ff) ranged from ca. 0.65 to 0.89; 2/17 values were below 0.75, 13/17 were above 0.75 indicating that overall TCEP was volatilized from water into air
Analytical Method and Analytical Details	GC-MS/EI; MDL: 0.15-4.5 ng/L (range is for all OPEs analyzed and not specific to TCEP); recovery: 91.8±10.5%; results corrected for both blank and surrogate recoveries.
Transformation Products, Statistics, and Kinetics	Not applicable; Not reported; Not reported
Reference Substance and Reference Substance Results	Not reported; Not reported

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance			
	Metric 1: Test Substance Identity	High	The test substance was identified by chemical name.
	Metric 2: Test Substance Purity	High	The test substance was compared to an analytical standard.
Domain 2: Test Design			
	Metric 3: Study Controls	N/A	This metric is not applicable to this type of study.
	Metric 4: Test Substance Stability	N/A	This metric is not applicable to this type of study.
Domain 3: Test Conditions			
	Metric 5: Test Method Suitability	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 6: Testing Conditions	Medium	This metric met the criteria for medium confidence as expected for this type of study; detail in supporting information.
	Metric 7: Testing Consistency	N/A	This metric is not applicable to this type of study.
	Metric 8: System Type and Design	High	This metric met the criteria for high confidence as expected for this type of study.

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Study Citation:	Zhang, L., Wang, Y., Tan, F., Yang, Y., Wu, X., Wang, W., Liu, D. (2020). Tidal variability of polycyclic aromatic hydrocarbons and organophosphate esters in the coastal seawater of Dalian, China. Science of the Total Environment 708:134441.			
OECD Harmonized Template:	Miscellaneous			
HERO ID:	6866245			
Domain	Metric	EVALUATION		Comments
		Rating		
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	N/A	The metric is not applicable to this study type.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 12:	Test Substance Purity	High	This metric met the criteria for high confidence as expected for this type of study.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 14:	Health Outcomes Unrelated to Exposure	N/A	The metric is not applicable to this study type.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	Medium	This metric met the criteria for medium confidence as expected for this type of study; specific concentrations and exact numerical values for the outcome were not reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	N/A	The metric is not applicable to this study type.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	This metric met the criteria for high confidence as expected for this type of study.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

Study Citation:	Zhao, H., Zhao, F., Liu, J., Zhang, S., Mu, D., An, L., Wan, Y., Hu, J. (2018). Trophic transfer of organophosphorus flame retardants in a lake food web. Environmental Pollution 242(Pt B):1887-1893.
OECD Harmonized Template:	Miscellaneous
HERO ID:	5164234

EXTRACTION

Parameter	Data
CASRN and Test Material	115-96-8; TCEP
Confidentiality, Type, Guideline	None; Experimental; Experimental
Solvent, Reactivity, Storage, Stability	NA; NR; Samples transported to laboratory on ice, frozen at -20°C until processing and analysis.; NR
Radiolabel, Source, State, Purity	NA; Organism samples collected from Meiliang Bay, in the southern part of the Yangtze River Delta, China; NA; NA
Test Method Details, Test Condition Details, and Test Consistency Details	Food web species collected from Meiliang Bay in China, which receives domestic, industrial, and agricultural discharges, were collected and analyzed for selected OPFRs to determine potential for trophic magnification.; Plankton: dominated by cyanobacteria. Invertebrates: clam, snail, freshwater mussel, white shrimp, freshwater shrimp. Fish: whitebait, ricefield eel, crucian, pipefish, silver fish, carp, whitefish, redfin culter, catfish, wolfish, and yellow-head catfish; n=6 for all species except carp (n=3); freshwater mussels and whitebait fish samples pooled, Lipid content: Plankton: 5.9±2.0%, Invertebrates: 6.4±2.4 - 14.3±2.8%, Fish (omnivorous): 8.8±1.6 - 10.4 ± 1.6%, Fish (carnivorous): 5.0±1.2 - 17.5±3.0%
System Type Design	NA, field study
Sampling Frequency and Sampling Details	August 2014; Plankton collected from 6 sites with 77 um mesh net; invertebrate and fish samples collected using bottom trawlers
Test Temperature	Not reported
Results Details	No significant correlation between TCEP and trophic level, p value above 0.05. TCEP concentrations: Plankton: 0.53 ng/g ww, Invertebrates: 0.61 – 1.4 ng/g ww, Fish (omnivorous): 1.9 – 11 ng/g ww, Fish (carnivorous): 0.34 – 4.9 ng/g ww, Trophic dilution likely caused by rapid metabolism in fish
Analytical Method and Analytical Details	UPLC-MS/MS; recovery of spiked samples ranged 46±9% to 120 ± 14%; internal standard recovery ranged from 45 ± 18% (TCEP-d12) to 98 ± 28% (TMPP-d21); Invertebrate and fish muscle tissue freeze-dried, ground, ultrasonic extracted 2x with ethyl acetate, concentrated to dryness under N2, redissolved in n-hexane, cleaned on NH2 SPE cartridge, eluted with DCM, concentrated and dissolved in methanol
Transformation Products, Statistics, and Kinetics	Not reported; p = 0.120, r ² = 0.15; No significant correlations observed between log wet wt. concentrations of chemical and trophic level. When normalized by lipid content, log chemical concentration decrease with increasing trophic level (not statistically significant); Not applicable
Reference Substance and Reference Substance Results	Procedural blanks; OPFRs detected 0.004 - 0.28 ng/g ww, results blank-corrected.

EVALUATION

Domain	Metric	Rating	Comments
Domain 1: Test Substance	Metric 1: Test Substance Identity	High	The chemical of interest was identified by name.
	Metric 2: Test Substance Purity	High	The field sample source was reported.
Domain 2: Test Design	Metric 3: Study Controls	High	Procedural blanks were included and were within an acceptable range, results were blank-corrected.
	Metric 4: Test Substance Stability	High	Sample storage and preparation were reported and appropriate.
Domain 3: Test Conditions			

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Study Citation:		Zhao, H., Zhao, F., Liu, J., Zhang, S., Mu, D., An, L., Wan, Y., Hu, J. (2018). Trophic transfer of organophosphorus flame retardants in a lake food web. Environmental Pollution 242(Pt B):1887-1893.		
OECD Harmonized Template:		Miscellaneous		
HERO ID:		5164234		
		EVALUATION		
Domain	Metric	Rating	Comments	
	Metric 5:	Test Method Suitability	High	The field study method was appropriate for the chemical of interest.
	Metric 6:	Testing Conditions	Medium	No environmental conditions or chemical environmental concentrations were reported.
	Metric 7:	Testing Consistency	High	Samples were collected, analyzed, and processed consistently.
	Metric 8:	System Type and Design	High	Field studies are assumed to be in dynamic equilibrium.
Domain 4: Test Organisms				
	Metric 9:	Outcome Assessment Methodology	N/A	The metric is not applicable to this study type.
	Metric 10:	Sampling Methods	High	Organism species, body length and weight where applicable, water content, and stable isotope (13C and 15N) ratios were reported.
Domain 5: Outcome Assessment				
	Metric 11:	Test Substance Identity	High	The outcome assessment was appropriate for determining trophic magnification.
	Metric 12:	Test Substance Purity	High	Sampling focused on appropriate species with acceptable sample sizes, and processing was appropriate. The same tissues for fish were analyzed across species.
Domain 6: Confounding/Variable Control				
	Metric 13:	Confounding Variables	High	No significant sources of uncertainty were identified, variability was addressed by statistical techniques.
	Metric 14:	Health Outcomes Unrelated to Exposure	High	No differences in organism health were reported.
Domain 7: Data Presentation and Analysis				
	Metric 15:	Data Reporting	High	The analytical method was appropriate, percent recoveries were reported, the limit of detection was not reported. Lipid contents were reported for all species and raw data was reported.
	Metric 16:	Statistical Methods and Kinetic Calculations	High	Statistical methods were described and applied appropriately.
Domain 8: Other				
	Metric 17:	Verification or Plausibility of Results	High	The results were reasonable based on the method, explanations for the apparent lack of trophic magnification were proposed.
	Metric 18:	QSAR Models	N/A	The metric is not applicable to this study type.
Overall Quality Determination		High		

List of Abbreviations and Acronyms for Data Quality Evaluation and Extraction Tables

Term	Definition
BAF	Biaccumulation Factor
BCF	Bioconcentration Factor
BMF	Biomagnification Factor
BSAF	Biota-sediment Accumulation Factor
C	Concentration
CASRN	Chemical Abstract Service registry number
DOC	Dissolved Organic Carbon
dw	Dry weight
DW	Drinking Water
DWTP	Drinking Water Treatment Plant
EPA	Environmental Protection Agency
ESI	Electrospray Ionisation
FID	Flame Ionisation Detector
FPD	Flame Photometric Detector
GC	Gas Chromatography
g/L	Grams per Liter
HLC	Henry's Law Constant
HPLC	High-performance liquid chromatography
ISO	International Organization for Standardization
K _{oa}	Octanol-Air partition coefficient
K _{oc}	Organic carbon-water partition coefficient
K _{ow}	Octanol-Water partition coefficient
L/d	Liters per day
LOD	Limit of Detection
LOQ	Limit of Quantification
lw	Lipid weight
M	Molarity (mol/L = moles per Liter)
mL/min	Milliliters per minute
mM	Millimolar
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mg/m ³	Milligrams per cubic meter
MRL	Method Reporting Limit
MS	Mass Spectrometry
n	Sample Size
N/A	Not applicable
ND	Non-Detection
ng/L	Nanograms per Liter

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Term	Definition
nm	Nanometers
NR	Not Reported
OECD	Organisation for Economic Co-operation and Development
· OH	Hydroxyl radical
OPE	Organophosphate Ester
pg/L	Picograms per Liter
ppm	parts per million
QSAR	Quantitative Structure Activity Relationship
RSD	Relative Standard Deviation
SI	Supplemental Information
SIM	Selected Ion Monitoring
SPE	Solid Phase Extraction
STP	Sewage Treatment Plant
TMF	Trophic Magnification Factor
TOC	Total Organic Carbon
TOF	Time of Flight
$\mu\text{g/L}$ or $\mu\text{g/mL}$	micrograms per liter or per milliliter
UPLC	Ultra-performance liquid chromatography
US or USA	United States of America
UV (UV-Vis)	Ultra Violet (Visible)
ww	Wet Weight
WWTP	Wastewater Treatment Plant