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CHEMICAL PRODUCTS SYNOPSIS

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DICHLOROBENZENE

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FOCUS.....The recent announcement by Dow Chemical that it was closing its Midland, Mich. plant is an indication of the poor performance experienced by these products over the past 10-20 years and the prospect that the future held no promise for any improvement. The Dow plant had capacity for over 250 million pounds of mono, di, tri, and tetrachlorobenzenes with Dow accounting for about 25% of industry capacity for the mono and di derivatives. Due to declining demand for practically all of the chlorobenzenes, capacity utilization in recent years probably did not exceed 60% despite shut downs in the early and late 1970's. Demand for the chlorobenzenes declined over the years for a variety of reasons although the environmental problems associated with many of their pesticide derivatives and loss of markets for use in chemical manufacturing due to development of alternate, more economical processes, dominate as reasons for the declines experienced.

The dichlorobenzenes rank second in volume to monochlorobenzene with total output of ortho and para-dichlorobenzene in 1981 reported by the U.S.I.T.C. at 125 million pounds, down from 140 million pounds in 1979 and 136 million pounds in 1970. Production of the dichlorobenzene isomers is estimated to have declined by an additional 10-15% in 1982 as the U.S. economy, particularly agriculture, slumped. Domestic demand, however, fell even more sharply with domestic usage in 1981 down by almost 1/3 since 1970 as exports of dichlorobenzenes (unspecified by isomer but estimated to be 90-95% para-dichlorobenzene), which were negligible prior to 1976, averaged better than 30 million pounds in recent years.

Production of ortho-dichlorobenzene in 1981 was reported at 51.6 million pounds, down from a high of 66 million pounds in 1970. The general decline in ortho-dichlorobenzene output is due to reduced demand for amide and urea herbicides made from 3,4-dichloroaniline, an ortho derivative, because of loss of market to other, more selective herbicides in corn and soybeans, the major markets for herbicides. Offsetting the loss in chemical manufacturing were small gains as a process solvent, particularly for the manufacture of isocyanates such as TDI. Consumption for this use is estimated at about 6-8 million pounds per year, primarily to make up for losses.

Para-dichlorobenzene production in 1981 amounted to 73.5 million pounds, up only slightly from 69.6 million pounds in 1970. However, with exports of para estimated at the 30 million pound per year level in recent years, actual domestic demand probably declined by about 40%. Until the mid 1970's para-dichlorobenzene had limited use as a chemical intermediate with dominant outlets in moth repellants and sanitary deodorants. While moth repellant use declined as wool consumption fell by more than 75% over the past two decades, deodorant applications have somewhat offset this decline. Deodorant use currently is probably twice as large as moth repellant applications. In the second half of the 1970's, the use of para-dichlorobenzene in the manufacture of polyphenylene sulfide (PPS) resin has shown steady growth and is estimated to account for about 10 million pounds of para consumption at the present time.

OUTLOOK.....There is little likelihood that demand for either ortho or para-dichlorobenzene will enjoy growth over the long term. Chemical uses for ortho-dichlorobenzene are expected to decline due to the replacement of 3,4-dichloroaniline based herbicides by newer, more effective products. Process solvent uses, while expected to grow, are in reality quite small.

The use of para-dichlorobenzene in polyphenylene sulfide (PPS) resin, Phillips trademark is Ryton, is really the only promising outlet for either of the dichlorobenzene isomers. However, growth in this application will not be rapid enough to overcome the expected decline in exports. With consumption of woolen goods (apparel and carpeting) stabilizing at about 100-110 million pounds per year, moth repellant uses should not decline any further while space and sanitary uses will grow, but at a slow rate.

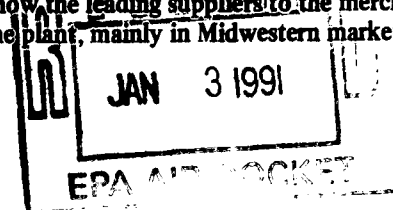
PRICING.....Published list prices for the dichlorobenzenes were unchanged for almost two years due to depressed demand, overcapacity, and lower costs for benzene and chlorine raw materials. Actual selling prices have been subject to temporary voluntary allowances and discounting. The TVA for para-dichlorobenzene was recently changed from 2 cents per pound to 1 cent to raise selling prices. Rising costs for benzene and chlorine during 1983 should result in some additional strengthening of prices during the year with increases likely.

AVERAGE PRICES RANGE - DICHLOROBENZENES CENTS PER POUND - TANKS - TRUCKLOAD - DELIVERED

	1960	1965	1970	1975	1979	1980	1981	1982	1983	1984	1985	1987
Trade List - Ortho	11	12½	15½	25	30-40	40-44	44	43	43-45	46	47	49
Average Sales Value	10	11	10	28	31	37	39					
Trade List - Para	12	12	14½	26½	25-39	39-42	42	40	40-42	43	44	46
Average Sales Value	10	9	9	25	31	39	38					

SUPPLY AND DEMAND	Millions of Pounds					Estimated			Domestic U.S.			
	1960	1965	1970	1975	1979	1980	1981	1982	1983	1984	1985	1987
Capacity-Ortho		50	80	130	105	105	105	105	75			
Production-Ortho	24.7	41.1	66.2	54.6	57.1	48.8	51.6	45	50	50	50	50
Capacity-Para		75	92	158	155	145	145	145	115			
Production-Para	64.0	65.8	69.7	45.8	83.5	75.0	73.5	65	70	65	60	55
Exports (o & p)				1	31	38	30	32				

AVAILABILITY.....With the Dow Chemical shut down, capacity for the dichlorobenzenes was substantially reduced but is still well in excess of demand. PPG Industries and Standard Chlorine Chemical are now the leading suppliers to the merchant market while Monsanto primarily sells byproduct material from its monochlorobenzene plant, mainly in Midwestern markets.



PRODUCERS AND CAPACITIES - ORTHO & PARA-DICHLOROBENZENE - MM LBS

PRODUCER	LOCATION	ORTHO	PARA
		1983 CAPACITY	1983 CAPACITY
Monsanto	Sauget, Ill.	5	10
PPG Industries	Natrium, W. Va.	20	30
Standard Chlorine Chemical	Delaware City, Del.	50	75
TOTAL		75	115

Based on announced capacities and trade estimates. In early 1983 Dow Chemical announced that it was quitting the chlorobenzenes business and shutting down its Midland, Mich. plant which produced mono, di, tri and tetrachlorobenzenes. Overall chlorobenzenes capacity was about 250 million pounds with 60 million pounds for ortho and para-dichlorobenzene combined.

END USES.....Ortho-dichlorobenzene is a colorless, volatile liquid with a pleasant aromatic odor. It has a boiling point of 180.5° C and a freezing point of -17.6° C. It is available as a technical grade (85-88% ortho-dichlorobenzene with varying amounts of para-dichlorobenzene and trichlorobenzene) and purified (95-96% ortho-dichlorobenzene). Para-dichlorobenzene is a white, crystalline material with a melting point of 53° C and a boiling point of 173.7° C. The crystalline solid is volatile, readily subliming at ordinary temperatures.

Over the years the dominant end use for para-dichlorobenzene has been as a moth repellent and space and sanitary deodorant. However, as consumption of wool declined over the past two decades due to competition from synthetic fibers, demand for moth repellants declined. In 1982 only 112 million pounds of wool was consumed in fabrics and carpeting, down from 240 million pounds in 1970 and 410 million pounds in 1960. Although moth repellent applications declined, deodorant uses increased. Para-dichlorobenzene is used in room and sanitary deodorant formulations. Para is sold by suppliers either in liquid or solid form to repellent or deodorant manufacturers who blend the material with perfumes and other additives and then fabricate finished products.

A relatively new and growing end use for para-dichlorobenzene is in the production of polyphenylene sulfide (PPS) resins which are fabricated into high performance plastic products. Polyphenylene sulfide is a crystalline, aromatic polymer in which recurring benzene rings are para-substituted with sulfur atom links. PPS plastics are highly resistant to chemical attack. Relatively few materials react with PPS even at high temperatures. The broad range of chemical resistance is second only to that of PTFE. In addition, flame resistance is inherent in the stable chemistry of PPS and the material usually requires no flame retardant additives. PPS finds use in electrical and electronics for telecommunications, computer components and high voltage applications. Industrial-mechanical applications include chemical processing equipment, such as submersible, centrifugal, vane and gear-type pumps suitable for aggressive environments. Para-dichlorobenzene has limited use as an intermediate for dyes and other organic chemicals.

The largest use for ortho-dichlorobenzene is as an intermediate for the production of pesticides, dyes and pharmaceuticals, primarily derivatives of 3,4-dichloroaniline made from 3,4-dichloronitrobenzene. The largest use of dichloroaniline is in amide and urea class herbicides such as propanil, the leading post emergent rice herbicide in the U.S.

Ortho-dichlorobenzene is used as a process solvent during the phosgenation of mono and diamines to isocyanates. It is used in formulated paint strippers and cleaners. Ortho-dichlorobenzene has been used as the primary solvent in carbon remover compounds for cleaning engines and engine parts. A stabilized and purified o-dichlorobenzene has been used as a heat transfer agent. Ortho-dichlorobenzene is also used to control termites and beetles.

END USE PATTERN - 1982 ESTIMATE - DOMESTIC

ORTHO		PARA	
DERIVATIVE	PERCENT	DERIVATIVE	PERCENT
Chemical Manufacture	65	Deodorant	44
Solvents	12	Moth Repellent	23
Miscellaneous	23	Resins	23
		Miscellaneous	10

MANUFACTURING.....Dichlorobenzenes are produced by the catalytic chlorination of benzene. When benzene is chlorinated to produce monochlorobenzene some dichlorinated products, primarily ortho and para, are also produced. After distillation to remove the monochlorobenzene, the crude still bottoms are sent to a dichlorobenzene still. Para-dichlorobenzene which has the lower boiling point, is distilled overhead and since it is a solid at ambient temperatures, crystallizes. The condensate is cooled to yield a slurry of para-dichlorobenzene in ortho. Para-dichlorobenzene is separated by centrifuge with ortho isomer recycled and combined with the bottoms of the dichlorobenzene still and sent to another still. A crude or technical ortho-dichlorobenzene is obtained with tri and tetrachlorobenzene in the bottoms. To obtain pure ortho isomer the technical material is redistilled.

Para-dichlorobenzene can be produced in high yield as a primary material by chlorinating benzene in the presence of aluminum chloride catalyst.

ENVIRONMENTAL ASPECTS.....Vapors of ortho-dichlorobenzene are irritating to the eyes. High concentrations can cause damage to the central nervous system while prolonged exposure can cause damage to liver and kidneys. Prolonged or repeated skin contact can cause local irritation or chapping of the skin.

High concentrations of para-dichlorobenzene such as might be found in confined storage spaces, are irritating to the eyes and throat. Prolonged exposure to vapors can cause dizziness, and liver damage may result from chronic exposure.

To the best of our knowledge the information contained herein is accurate. However, we do not assume any liability whatsoever for the completeness or accuracy of this report.