halation of chlorobromomethane were marked visceral congestion, fatty degeneration of the liver, kidney and occasionally heart, lipoid depletion of the adrenal cortex, interstitial pneumonitis and, in animals that died, opacity of the eyes. Such changes were minimal or absent even in mice given several consecutive daily exposures if they were killed more than 72 hours after the end of their first exposure. Necrosis and cirrhosis of the liver of the type seen after carbon tetrachloride exposure was not observed in mice, rats, rabbits and dogs even after many inhalation exposures.

Matson and Dufour noted that a 2-hour exposure to 106 g/m^3 (2% by vol.) killed 2 out of 3 guinea pigs (3).

Comstock and Oberst (4) reported that rats died after a 15-minute exposure to concentrations in the range 152-170 g/m^3 (2.9-3.2% by vol.) and that 142-150 g/m^3 (2.7-2.9% by vol.) was fatal to mice after a 15-minute exposure. The acute narcotic effects of chlorobromomethane in rats were studied in detail by these authors (5).

The present threshold limit value is based largely on the extensive work of Torkelson, et al. (6). These authors performed single and repeated vapor exposures, oral administration and topical application to skin and eyes in mice, rats, guinea pigs, rabbits and dogs. In single inhalation exposures with rats, no deaths were produced by 40,000 ppm for 0.1 hour, 20,000 ppm for 0.4 hour, 10,000 ppm for 1.5 hours or 5000 ppm for 7 hours. In repeated inhalation trials extending over 6 months, adverse effects were noted in all species at 1000 ppm. Only minor responses were observed in female rats at 500 ppm. No effects of consequence were seen at 370 ppm. They concluded that chlorobromomethane causes a rather prolonged anesthesia at high concentrations and has only a slight capacity to produce a liver injury which is reversible.

On the basis of the above animal data the threshold limit value has been set at 200 ppm.

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CHLORODIPHENYL - 42% CHLORINE - Skin

1 mg/m^3

Acne, systemic poisoning and even death may result from exposure to chlorinated diphenyls (1,2). Acne is not an invariable warning sign of impending, more severe, systemic toxicity. Helgs (3) has reported 7 cases of mild to moderate chloracne among 14 workers exposed to a few parts per million of the vapors of Arochlor (chlorinated diphenyl). The material has been shown to be absorbed through the skin causing fatty degeneration of the liver (4). Treon, et al. (5) found Arochlor "1242" to be without detectable effect on laboratory animals after 150, 7-hour exposures at 1.9 mg/m^3 (0.18 ppm) and that 24, 7-hour exposures at 8.6 mg/m^3 were probably without effect. Treon points out that the probability of industrial occurrence of the latter vapor concentrations is small, as they approach saturation; exposure to particulate matter as con-

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densed droplets is possible, however.

The threshold limit of 1 mg/m^3 would seem to offer reasonably good protection against severe systemic toxicity but may not guarantee complete freedom from chloracne

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CHLORODIPHENYL - 54% CHLORINE - Skin

0.5 mg/m^3

From an extensive study of the penta-and hexachloro-naphthalenes, chlorinated diphenyls, and a mixture of these in animals by various routes of administration, including chronic exposure via the respiratory tract, plus a study of industrial exposures, Cecil Drinker, et al. (1,2) concluded that 0.5 mg/m^3 of chlorinated aromatic compounds containing more than 3 chlorine atoms per molecule should represent the limiting concentration for human exposure.

More recently Treon (3) studied the effects of two chlorinated diphenyl derivatives containing 42% and 54% chlorine respectively, in animals exposed 7 hours daily for 150 days during a period of 210 days. From the information derived from this carefully done and extensive study, a level of 0.5 mg/m^3 for chlorinated diphenyls containing 54% chlorine would appear reasonable for repeated daily exposures of industrial workers by analogy with chlorodiphenyl - 42% chlorine.

References:

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C CHLOROFORM (Trichloromethane)

50 ppm (Approximately 250 mg/m^3)

Cook (1) noted that 100 ppm for chloroform is generally accepted on the basis of analogy with carbon tetrachloride whose action it resembles. He believed that this value may be high and suggested exposures be kept below 50 ppm until more data are available. Patty (2) suggests 300 to 400 ppm as a practical working level, but this is obviously too high on the basis of subsequent experiences. Challen (3) and associates reported severe symptoms (lassitude, digestive disturbances, mental dullness) in workers exposed to 80 to 240 ppm of chloroform and less severe symptoms in a group exposed to 20 to 70 ppm.

The limit of 50 ppm is recommended as the basis of protecting against any serious short-term subjective effects and probably against long-term effects on the liver. Reported experience is presently lacking on the latter, so that the TLV of 50 ppm should

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