

## CHLORINATED PARAFFINS (C<sub>12</sub>, 60% CHLORINE)

CAS No. 108171-26-2

First Listed in the *Fifth Annual Report on Carcinogens*

### CARCINOGENICITY

Chlorinated paraffins (C<sub>12</sub>, 60% chlorine) are *reasonably anticipated to be human carcinogens* based on sufficient evidence of carcinogenicity in experimental animals (IARC 1990). When administered by gavage, chlorinated paraffins are carcinogenic in rats and mice of both sexes. Chlorinated paraffins caused increased incidences of hepatocellular neoplasms in male and female rats, adenomas of the kidney tubular cells in male rats, and follicular cell adenomas of the thyroid gland in female rats. Mononuclear cell leukemia in male rats may have been related to administration of chlorinated paraffins. In male and female mice, chlorinated paraffins caused increased incidences of hepatocellular neoplasms. Female mice administered chlorinated paraffins also showed increased incidences of adenomas of thyroid gland follicular cells (NTP 1986).

No data were available to evaluate the carcinogenicity of chlorinated paraffins in humans (IARC 1990).

### PROPERTIES

Chlorinated paraffins are light yellow-to-amber colored, viscous, oily liquids that are usually odorless. The commercial products are complex mixtures that contain paraffins of different carbon-chain length and varying chlorine content. The commercial products may contain isoparaffins (<1%), aromatic compounds (<0.1%) and metals as contaminants, but normally contain stabilizers to inhibit decomposition. Chlorinated paraffins are practically insoluble in water, but many products may be emulsified with water. They are miscible with benzene, chloroform, ether, and carbon tetrachloride. Chlorinated paraffins are slightly soluble in alcohol and are soluble in most aromatic, aliphatic, and terpene hydrocarbons, ketones, esters, and vegetable and animal oils. Chlorinated paraffins have low volatility and are nonflammable. When heated to decomposition, they emit toxic fumes of hydrochloric acid and other chlorinated compounds (WHO 1996, HSDB 2000).

### USE

In the U.S., about half of the chlorinated paraffins are used as extreme pressure lubricant additives in metal working (IARC 1990). Approximately 25% is used in flame retardants and plasticizers for plastics. The remainder is used in rubber, paints, adhesives, and caulks and sealants. About 4% of domestic production is exported or used as a plasticizer in inks, paper, and textile coatings, and flexible polyvinyl chloride (SRI 1983, 1985, WHO 1996, HSDB 2000).

### PRODUCTION

Large amounts of chlorinated paraffins were used as solvents for Dichloramine T in antiseptic nasal and throat sprays between 1914 and 1918 (WHO 1996). Commercial production of chlorinated paraffins for use as extreme pressure additives in lubricants began in the 1930s. Chlorinated paraffins are currently marketed in a variety of products containing different carbon-

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chain lengths and chlorine content (IARC 1990). Commercial trade names for chlorinated paraffins include Cereclor, Chlorowax, and Clorafin. The HSDB (2000) listed four U.S. manufacturers. U.S. production ranged from approximately 37,000 to 45,000 metric tons between 1977 and 1990 (IARC 1990, WHO 1996). The 1997 *Directory of Chemical Producers* identified four producers of chlorinated paraffins, producing a total of 211 million lb or about 96,000 metric tons (SRI 1997).

The production capacity of chlorinated paraffins declined from 263 million lb in 1980 to 218 million lb in 1983. This decline was blamed on economic conditions in the petrochemical industry and in the end-use industries where demand had grown by <1% over the previous decade; future growth of this market was expected to be sluggish (Long 1984).

No recent information on exports or imports of chlorinated paraffins were found; however, past export data for C<sub>10</sub>-C<sub>30</sub> length chlorinated paraffins were available. In 1984, 14.4 million lb were exported, a decrease from the 21.6 million lb reported for 1983 (USDOC Exports 1984, 1985). In 1982, the figure was 16.2 million lb, with 3.6 million lb of paraffins with 35-64% chlorine content (USDOC Exports 1983, Long 1984).

### EXPOSURE

No information on potential human exposure specific to chlorinated paraffins (C<sub>12</sub>, 60% chlorine) was found, but information on potential human exposure to the class of chlorinated paraffins was available. The primary routes of potential human exposure include ingestion, both directly and through contamination of foodstuffs (Campbell and McConnell 1980) and dermal contact with products containing chlorinated paraffins (HSDB 2000). Chlorinated paraffins have been isolated from human liver (up to 1.5 ppm), kidneys (up to 0.5 ppm) and adipose tissue (up to 0.6 ppm). Various chlorinated paraffins exhibit little or no potential to irritate the skin of humans, and no incidents of human intoxication have been reported in workers involved in the handling or manufacturing of chlorinated paraffins (NTP 1986). Occupational exposure is likely in production plants or in industries using chlorinated paraffins (WHO 1996). Between 1972 and 1974, 1.5 million workers were potentially exposed to chlorinated paraffins (IARC 1990). The National Occupational Exposure Survey (1981-1983) indicated that 573,193 workers, including 38,354 women, were potentially exposed to chlorinated paraffins (NIOSH 1984).

### REGULATIONS

EPA regulates chlorinated paraffins under the Toxic Substances Control Act (TSCA), the Resource Conservation and Recovery Act (RCRA), and the Clean Air Act (CAA). TSCA's Interagency Testing Committee (ITC) has designated chlorinated paraffins as priority chemicals and has recommended testing.

FDA regulates chlorinated paraffins as indirect food additives, adhesives, and components of other products that may come into contact with foods.

OSHA regulates chlorinated paraffins under the Hazard Communication Standard and as chemical hazards in laboratories. Regulations are summarized in Volume II, Table 34.

## REFERENCES

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