HEXACHLOROETHANE

Hexachloroethane is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 67-72-1 Cl_3CCCl_3

Molecular Formula: C_2Cl_6

Hexachloroethane is found as colorless crystals that have a camphor-like odor. It is soluble in alcohol, benzene, chloroform, ether, and oils, and is insoluble in water (Sax, 1987). Hexachloroethane readily sublimes without melting (Merck, 1983).

Physical Properties of Hexachloroethane

Synonyms: carbon hexachloride; carbon trichloride; perchloroethane; hexachloroethylene; ethane hexachloride; ethylene hexachloride; 1,1,1,2,2,2-hexachloroethane

Molecular Weight:	236.74
Boiling Point:	186 °C
Melting Point:	186.8 °C (sublimes)
Vapor Density:	8.16 (air = 1)
Density/Specific Gravity:	2.09 at 20/4 °C (water = 1)
Vapor Pressure:	0.21 mm Hg at 20 °C
Log Octanol/Water Partition Coefficient:	3.82
Water Solubility:	50 mg/l at 22.3 °C
Henry's Law Constant:	2.8×10^{-3} atm-m^3/mole
Conversion Factor:	1 ppm = 9.7 mg/m^3

(Howard, 1990; HSDB, 1991; Merck, 1983; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Hexachloroethane is used as a solvent, in explosives, as a camphor substitute in celluloid, as a component of screening smokes and extreme pressure lubricants, and as a degassing agent in the production of aluminum and magnesium metals. It is also used in organic synthesis, as a retarding agent in fermentation, for refining aluminum alloys, for removing impurities from molten metals, for recovering metals from ores or smelting products, and for improving the quality of various metals and alloys.

It is formed in small amounts in industrial chlorination processes designed to produce lower chlorination products, and during combustion and incineration of chlorinated wastes. Other potential sources of hexachloroethane are inefficient solvent recovery and recirculation and chlorination of sewage effluent prior to discharges are other potential sources of hexachloroethane (HSDB, 1991).

The primary sources of hexachloroethane emissions in California reported in the United States Environmental Protection Agency's (U.S. EPA) 1995 Toxics Release Inventory (TRI) Public Data Release Report were the chemical and allied products industries (U.S. EPA, 1996b).

B. Emissions

In California, approximately 5 pounds of hexachloroethane emissions were reported in the U.S. EPA 1995 TRI Public Data Release Report (U.S. EPA, 1996b).

C. Natural Occurrence

Hexachloroethane is not known to occur naturally (Howard, 1990).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of hexachloroethane. However, the U.S. EPA has compiled ambient air data from several urban and suburban locations throughout the United States from 1976-78. From these data, the U.S. EPA estimated an overall mean concentration of 0.01 micrograms per cubic meter ($\mu g/m^3$) (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of hexachloroethane was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Hexachloroethane will be chemically non-reactive in the troposphere and the major tropospheric removal process will be transport into the stratosphere. The tropospheric half-life and lifetime of hexachloroethane are expected to be about 35 years and 50 years, respectively, due to vertical transport to the stratosphere (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Since no emissions of hexachloroethane from stationary sources in California have been reported under the AB 2588 program, it was not listed in any of the risk assessments reviewed by the Office of Environmental Health Hazard Assessment.

HEALTH EFFECTS

Probable routes of human exposure to hexachloroethane are inhalation, ingestion, and dermal contact (NTP, 1994a).

Non-Cancer: Hexachloroethane is a central nervous system depressant. Inhalation exposure to hexachloroethane may also cause mild irritation to the eyes, nose, throat, and lungs at high concentrations. Hexachloroethane also causes liver and kidney injury at high doses in test animals (Sittig, 1991).

The U.S. EPA is currently reviewing the Reference Concentration (RfC) for hexachloroethane. The U.S. EPA has established an oral Reference Dose (RfD) of 0.001 milligrams per kilogram per day for hexachloroethane based on atrophy and degeneration of the renal tubules in rats. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of hexachloroethane in humans. Rats exposed to high concentrations of hexachloroethane by inhalation exhibited maternal toxicity, but there was no evidence of fetotoxicity or birth defects. Rats exposed to high concentrations via gavage showed maternal toxicity, a reduced gestation index, a reduction in the number of fetuses, and increased fetal resorption rates (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of hexachloroethane in humans. Mice orally exposed to hexachloroethane were reported to develop hepatocellular carcinomas. The U.S. EPA has classified hexachloroethane as Group C: Possible human carcinogen with an inhalation unit risk estimate of 4×10^{-6} (microgram per cubic meter)$^{-1}$. The U.S. EPA estimates that if a person were to breathe air containing hexachloroethane at 0.3 $\mu g/m^3$ over an entire lifetime that person would theoretically have no more than a 1 in 1 million increased chance of developing cancer (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified hexachloroethane as Group 3: Not classifiable (IARC, 1987a).

The State of California has determined under Proposition 65 that hexachloroethane is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 1.1×10^{-5} (microgram per cubic meter)$^{-1}$ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 $\mu g/m^3$ of hexachloroethane is estimated to be no greater than 11 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 3.9×10^{-2} (milligram per kilogram per day)$^{-1}$ (OEHHA, 1994).