

HEXANE

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

CAS Registry Number: 110-54-3



Molecular Formula: C_6H_{14}

Hexane is a colorless, volatile liquid with a faint odor. It is soluble in alcohol, ether, chloroform, and acetone, and insoluble in water. Hexane poses a very dangerous fire and explosion hazard when exposed to heat or flame (Sax, 1989).

Physical Properties of Hexane

Synonyms: dipropyl; hexyl hydride; n-hexane

Molecular Weight:	86.18
Boiling Point:	68.7 °C
Melting Point:	-95 to -100 °C
Flash Point:	-9 °F
Vapor Density:	2.97 (air = 1)
Vapor Pressure:	150 mm Hg at 24.8 °C
Density/Specific Gravity:	0.659 at 20/4 °C (water = 1)
Log Octanol/Water Partition Coefficient:	3.90 - 4.11
Conversion Factor:	1 ppm = 3.52 mg/m ³

(HSDB, 1991; Merck, 1989; Sax, 1987; Sax, 1989)

SOURCES AND EMISSIONS

A. Sources

Hexane is a component of many products associated with the petroleum and gasoline industries, and is a combustion product of polyvinyl chloride (HSDB, 1991). Hexane is also used as a solvent, in low temperature thermometers, calibrations, polymerization reaction mediums, as a paint diluent, and as an alcohol denaturant. It is also used in the determination of the refractive index of minerals (Merck, 1989).

The primary stationary sources that have reported emissions of hexane in California are manufacturers of rubber and plastic footwear, manufacturers of preserved fruits and vegetables, and public order and safety facilities (ARB, 1997b).

B. Emissions

The total emissions of hexane from stationary sources in California are estimated to be at least 62,000 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Hexane is a constituent in the paraffin fraction of crude oil and natural gas (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of hexane. However, the United States Environmental Protection Agency (U.S. EPA) has compiled ambient air data from several urban to suburban locations throughout the United States from 1968-87. From these data, the U.S. EPA has calculated a mean average concentration of 12.6 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) or 3.6 parts per billion (ppb) with an overall data range of 0 to 273 $\mu\text{g}/\text{m}^3$ (0 to 78 ppb) (U.S. EPA, 1993a).

INDOOR SOURCES AND CONCENTRATIONS

Hexane has been measured inside vehicles as part of a study conducted in Raleigh, North Carolina. An average hexane concentration of 13.6 $\mu\text{g}/\text{m}^3$ (3.9 ppb) and a maximum concentration of 155 $\mu\text{g}/\text{m}^3$ (44 ppb) were measured; about 4 times greater than the concentrations measured from outdoor monitors (Chan et al., 1991a).

ATMOSPHERIC PERSISTENCE

Hexane is expected to exist almost entirely in the vapor phase in the atmosphere due to its relatively high vapor pressure. The dominant tropospheric loss process for hexane is by reaction with the hydroxyl (OH) radical. The calculated half-life and lifetime of hexane due to reaction with the OH radical are 1.8 days and 2.6 days, respectively (Atkinson, 1995). The products of the OH radical-initiated reaction include 2-hexanone, 2- and 3-hexyl nitrate and 5-hydroxy-2-pentanone (Atkinson, 1994; Kwok et al, 1995b).

AB 2588 RISK ASSESSMENT INFORMATION

Although hexane is reported as being emitted in California from stationary sources no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to hexane are inhalation and dermal contact.

Non-Cancer: Acute inhalation exposure of humans to hexane causes central nervous system depression and irritation of the eyes, nose and throat. Symptoms observed include dizziness, giddiness, slight nausea, and headache. Chronic inhalation exposure to hexane is associated with polyneuropathy in humans, with numbness in the extremities, muscular weakness, blurred vision, headache, and fatigue (U.S. EPA, 1994a).

The U.S. EPA has established a Reference Concentration (RfC) of 0.2 milligrams per cubic meter based on neurotoxicity and epithelial lesions in the nasal cavity in humans. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) (U.S. EPA, 1994a).

No information is available on adverse reproductive effects caused by hexane in humans. Testicular damage has been observed in male rats exposed to hexane via inhalation (U.S. EPA, 1994a). Prenatal exposure to high concentrations of hexane has been associated with adverse effects on growth and viability in mice and rats (Reprotox, 1996).

Cancer: No information is available on the carcinogenic effects of hexane in humans or animals. The U.S. EPA has classified hexane in Group D: Not classifiable as to human carcinogenicity. A carcinogenic risk assessment is currently under review by the U.S. EPA (U.S. EPA, 1994a). The International Agency for Research on Cancer (IARC) has not classified hexane as to its human carcinogenicity (IARC, 1987a).

