



# HEXACHLOROETHANE

## PROFILE OF DRINKING WATER CONTAMINANTS FOR EMERGENCY RESPONSE

### GENERAL INFORMATION

Hexachloroethane is used by the military in the production of pyrotechnic devices and screening smokes. It is commercially used as a pressure lubricant, in fluorocarbon production, and in rubber, insecticide, paint, and fire extinguishing formulations.

Most hexachloroethane used in the United States is imported with an annual import of about 1.6 million pounds between 1973-1979. U.S. production is generally limited to its formulation as a co-product in the manufacture of other chlorinated ethanes. Average annual (1966-1977) use of hexachloroethane for military smoke devices was 193,000 pounds. Hexachloroethane wastes occur in effluents from chemical plants and have been found in ground water, soil, and air.

The environmental fate of hexachloroethane is not well established, but experimental data indicate that it volatilizes to the atmosphere from water and soil. In the atmosphere, it is generally stable. It can be biotransformed, will adsorb to sediments, and bioaccumulates.

### PHARMACOKINETICS

Hexachloroethane is absorbed following ingestion, inhalation, or dermal contact in rats, mice, rabbits, and sheep. It preferentially accumulates in body fat. It is excreted primarily in expired air and urinary excretion plays a minor role. Following oral intake, it is metabolized mainly to tetrachloroethylene in sheep, and to trichloroethanol and trichloroacetic acid in rats and mice. Reduction and dechlorination is proposed as the main mode of metabolism of hexachloroethane.

### HEALTH EFFECTS

#### Humans

Ingestion of hexachloroethane by two persons over a 3-4 day period reduced their skin sensitivity.

Data from occupational health surveys indicate that hexachloroethane adversely affects the central nervous system (typically, workers cannot close their eyes). Direct exposure to hexachloroethane fumes causes eye irritation, inflammation, tearing, and photophobia.

### HEALTH EFFECTS

#### Experimental Animals

Acute oral toxicity in rats and guinea pigs is associated with tremor, ataxia, gasping, and red exudate around the eyes. Single oral doses in sheep produced liver toxicity.

Hexachloroethane is a mild skin irritant in rabbits and causes eye swelling and discharge, corneal opacity, and iritis. No skin sensitization was observed in guinea pigs.

Decreased body weight gain, increased liver and kidney weights, and liver and kidney histopathology were seen in rabbits given oral doses for 12 days and rats similarly exposed for 16 days. Additional adverse kidney effects are observed in male rats.

In a 16-week feeding study with rats, histopathological lesions were evident in the kidneys of males as well as some liver lesions.

No reproductive studies were found. Although hexachloroethane was not shown to be teratogenic, fetotoxic effects were indicated. Mutagenic tests in bacterial assays were negative.

The toxic effects following 78 weeks of oral exposure were tumors of the testes in male rats, and liver carcinomas in mice. Toxic effects seen in a 2-year oral study with rats included cancer of the kidneys in males.

### OTHER CRITERIA, ANALYSES, AND TREATMENT TECHNOLOGIES

The American Conference of Governmental Industrial Hygienists (ACGIH) 8-hour time-weighted average Threshold Limit Value for exposure to hexachloroethane is 9.7 mg/m<sup>3</sup>. The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit is 10 mg/m<sup>3</sup>.

Methods available for the analysis of hexachloroethane involve extraction with an organic solvent followed by various modifications of the gas-liquid chromatography technique.

No information was found regarding technologies for the removal of hexachloroethane from water. However, in studies of environmental fate, hexachloroethane in water has been biotransformed under aerobic and anaerobic conditions.

## Physical and Chemical Properties

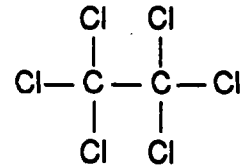
**Empirical Formula**  
**Synonyms**



Carbon hexachloride, Perchloroethane, Ethanehexachloride, 1,1,1,2,2,2-Hexachloroethane, Hexachlorethylene, Avlothane, Distokal, Distopan, Distopin, Egitol, Falkitol, Fasciolin, Hexoram, Phenohep

**CAS Number**  
**Physical State**  
**Molecular Weight**  
**Boiling Point**  
**Melting Point**  
**Density**  
**Vapor Pressure**  
**Solubility**

67-72-1  
White crystalline solid  
236.74  
186.8°C  
186.8-187.4°C (sublimes)  
2.091 at 20°C  
0.4 mmHg at 20°C  
In water: 50 mg/L at 22°C. Very soluble in alcohol and ether. Soluble in benzene, chloroform, and oils.



## Health Effects Data and Advisory Values

**Genotoxicity**

Hexachloroethane did not induce genetic effects in *in vitro* *Salmonella typhimurium* and *Saccharomyces cerevisiae* assays.

**Reproductive and Developmental Effects**

No reproductive studies were found. A developmental effects study in rats orally exposed to hexachloroethane indicated that it is not teratogenic, although gestation time was reduced, the number of viable fetuses was decreased, and there was an increase in fetal resorption.

**Cancer Classification**

EPA Group C, possible human carcinogen, based on hepatocellular carcinomas in B6C3F<sub>1</sub> mice of both sexes.

**Reference Dose (RfD)**

0.0013 mg/kg/day

**Drinking Water Equivalent Level (DWEL)**

0.035 mg/L

**Health Advisory Values**

One-Day	5 mg/L
Ten-Day	5 mg/L
Longer-Term (child)	0.13 mg/L
Longer-Term (adult)	0.45 mg/L
Lifetime	0.001 mg/L

This summary was developed using information from the Drinking Water Health Advisory. For further information contact EPA's Office of Science and Technology at (202) 260-7571.

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