

US EPA ARCHIVE DOCUMENT

Technical Factsheet on: HEPTACHLOR AND HEPTACHLOR EPOXIDE

[List of Contaminants](#)

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards (in mg/L)

| | MCLG | MCL | HAL(1day) |
|------------------|--------|------|-----------|
| Heptachlor: zero | 0.0004 | 0.01 | |
| - epoxide zero | 0.0002 | 0.01 | |

Health Effects Summary

Acute: EPA has found heptachlor to potentially cause liver and central nervous system damage from short-term exposures at levels above the MCL.

Short-term exposures in drinking water which are considered "safe" for a 10-kg (22 lb.) child consuming 1 liter of water per day: a one- to ten-day exposure to 0.01 mg/L.

Chronic: Heptachlor and its epoxide have the potential to cause extensive liver damage from long-term exposure at levels above the MCL.

Cancer: There is some evidence that both heptachlor and heptachlor epoxide have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

Production of heptachlor in 1982 was nearly 100,000 lbs, all of which was used as a non-agricultural insecticide. Most uses of the product were cancelled in 1978. The only permitted commercial use of heptachlor products is for fire ant control in buried, pad-mounted electric power transformers, and in underground cable television and telephone cable boxes.

Release Patterns

Heptachlor may be released directly to the soil in connection with its use in termite and fire ant control. However, heptachlor has been found in treated wastewater from some types of industrial facilities. Based on monitoring data, mean loadings in various wastestreams are: coal mining - 0.0081, foundries - 0.030 and nonferrous metals manufacturing - 0.0008.

Heptachlor epoxide is not produced commercially, but rather is formed by the chemical and biological transformation of heptachlor in the environment.

Environmental Fate

Release of heptachlor to soil surfaces will result in volatilization from the surface, especially in moist soils, but volatilization of heptachlor incorporated into soil will be slower. Hydrolysis in moist soils is expected to be significant. In soil, heptachlor will degrade to 1-hydroxychlorodene, heptachlor epoxide and an unidentified metabolite less hydrophilic than heptachlor epoxide. Biodegradation may also be significant. Heptachlor is expected to adsorb strongly to soil and, therefore, to resist leaching to groundwater.

Heptachlor epoxide adsorbs strongly to soil and is extremely resistant to biodegradation, persisting for many years in the upper soil layers. Some volatilization or photolysis loss may occur.

Release of heptachlor to water will result in hydrolysis to 1-hydroxychloridene (half-life of about 1 day) and volatilization. Adsorption to sediments may occur. Biodegradation of heptachlor may occur, but is expected to be slow compared to hydrolysis. Direct and photosensitized photolysis may occur but are not expected to occur at a rate comparable to that of hydrolysis. Heptachlor epoxide will adsorb strongly to suspended and bottom sediment when released to water. Little biodegradation is expected.

In air, vapor phase heptachlor will react with photochemically generated hydroxyl radicals with an estimated half-life of 36 min. Direct photolysis may also occur. Heptachlor epoxide is expected to exist in both the vapor and particulate phases in ambient air. Vapor phase reactions with photochemically produced hydroxyl radical may be an important fate process (an estimated half-life of 1.5 days). Heptachlor epoxide that associated with particulate matter and aerosols should be subject to gravitational settling and washout by rain. Due to its stability, long range dispersal occurs, resulting in the contamination of remote areas. Some photolysis loss probably occurs but there is no data to evaluate the rate of this process.

Bioconcentration of heptachlor may be significant: bioconcentration factors average around 12,000 in various fish species. Bioconcentration may be limited, however, by the rapidity of heptachlor hydrolysis in water and the adsorption of heptachlor to sediments. Heptachlor epoxide is bioconcentrated extensively. It is taken up into the food chain by plants and bioconcentrates into fish, animals and milk.

Chemical/ Physical Properties

CAS Number: Heptachlor- 76-44-8; Heptachlor epoxide- 1024-57-3

Color/ Form/Odor: White to light tan waxy solid with a camphor-like odor. Available as emulsifiable concentrates and oil solutions. The epoxide is formed from heptachlor in the environment.

M.P.: 95-96 C B.P.: 145 C

Octanol/Water Partition (Kow): Log Kow = 3.9 to 5.4 (est.)

Density/Spec. Grav.: 1.57 at 9 C

Solubility: 0.03 mg/L of water at 25 C; insoluble in water

Vapor Pressure: 3×10^{-4} mm Hg at 25 C

Soil sorption coefficient: Log Koc estimated at 4.48; low to very low mobility in soil

Odor/Taste Thresholds: N/A

Bioconcentration Factor: 5000 to 15,000 in fish; potential to bioconcentrate in aquatic organisms.

Henry's Law Coefficient: 2.62×10^{-3} atm-cu m/mole;

Trade Names/Synonyms: 3-Chlorochlordene; Aahepta; Agroceres, Hepta, Heptachlordane, Heptagran, Heptamul, Heptox, Gold Crest H-60, Rhodiachlor, Velsicol 104, Basaklor, Soleptax, Termide

Other Regulatory Information

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years
Repeat Frequency- If no detections during initial round:
 2 quarterly per year if serving >3300 persons;
 1 sample per 3 years for smaller systems
Triggers - Return to Initial Freq. if:
 Heptachlor detected at > 0.0004 mg/L, or
 epoxide detected at > 0.0002 mg/L

Analysis:

Reference Source Method Numbers

EPA 600/4-88-039 505; 508; 508.1; 525.2

Treatment- Best Available Technologies:
Granular Activated Charcoal

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000
National Pesticide Hotline - 800/858-7378