The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

General Populations

- Because of the persistence of both heptachlor and heptachlor epoxide in the environment, exposure to the general population can occur from contaminated food, milk, water, soil, and air.
- Contaminated foods might include fish, shellfish (e.g., clams), dairy products, vegetables, meat, and poultry.
- Children and toddlers drink large amounts of milk and may have greater exposure if the milk is contaminated with heptachlor or heptachlor epoxide.
- People who live in homes where heptachlor was used for termite control or on farms where heptachlor was used on crops may have a higher risk of exposure through contaminated crops, soil, water, and air.

Occupational Populations

- Workers who use heptachlor to kill fire ants are exposed if they breathe in the heptachlor or get it on their skin.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- The available data suggest that at least 50% of ingested heptachlor is absorbed through the gastrointestinal tract.
- Heptachlor has a very short half-life in animals, whereas heptachlor epoxide has a long one, especially in adipose tissue.
- Heptachlor is rapidly converted to heptachlor epoxide.
- Heptachlor and heptachlor epoxide can accumulate in breast milk.
- Heptachlor and heptachlor epoxide are primarily excreted in the feces as parent compound and metabolites.

Normal Human Levels

- Heptachlor epoxide levels ranging from 60 to 220 ppb (mean of 159 ppb) were measured in adipose tissue samples collected in the early 1980s.
- Heptachlor epoxide levels in breast milk samples (collected in the early 1980s) ranged from 66.1 to 128 ppb.

Biomarkers/Environmental Levels

Biomarkers

- No specific biomarkers or clinical conditions due to exposure to heptachlor or heptachlor epoxide are known.
- The presence of heptachlor in biological media may reflect exposure to heptachlor or chlordane because heptachlor is a metabolite of chlordane.
- The presence of heptachlor epoxide may reflect an exposure to heptachlor or to chlordane since heptachlor epoxide is a metabolite of both these pesticides.

Environmental Levels

Air

- Very low levels (0.04 ng/m^3) of heptachlor have been detected in air samples.

Sediment and Soil

- Heptachlor and heptachlor epoxide have been detected in less than 1% or 2%, respectively, of sediment samples.

Water

- Heptachlor was found in less than 2% of the groundwater samples known to be contaminated by pesticide application.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Heptachlor and Heptachlor Epoxide. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Heptachlor

$C_{10}H_5Cl_7$
CAS# 76-44-8

Heptachlor Expoxide

$C_{10}H_5Cl_7O$
CAS# 1024-57-3

October 2007

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

Contact Information:
Division of Toxicology
and Environmental Medicine
Applied Toxicology Branch

1600 Clifton Road NE, F-32
Atlanta, GA 30333
1-800-CDC-INFO
1-800-232-4636
www.atsdr.cdc.gov/toxpro2.html

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

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Chemical and Physical Information

Pure heptachlor is a white powder

- Heptachlor epoxide is the primary degradation product of heptachlor. About 20% of heptachlor is changed within hours into heptachlor epoxide in the environment and in your body.
- Heptachlor does not dissolve easily in water.
- There are no natural sources of heptachlor or heptachlor epoxide.
- Heptachlor was used in the past for killing insects in homes, in buildings, and on food crops. It has not been used for these purposes since 1988.
- Heptachlor is still approved by the Environmental Protection Agency (EPA) for killing fire ants in power transformers.

Routes of Exposure

- Inhalation – Minor route of exposure for the general population.
- Oral – Primary route of exposure is through the diet.
- Dermal – Minor route of exposure.

Heptachlor and Heptachlor Epoxide in the Environment

- Heptachlor is converted to heptachlor epoxide in the environment. The heptachlor epoxide is degraded more slowly and is thus more persistent.
- Heptachlor partitions somewhat rapidly to the atmosphere from surface water and that volatilization is significant. In contrast, heptachlor epoxide partitions slowly to the atmosphere from surface water. Heptachlor in water has an estimated half-life of 3.5 days. Heptachlor epoxide has a half-life in water of at least 4 years.
- Heptachlor and heptachlor epoxide adsorb strongly to sediments.
- Temperature and humidity affect the persistence of heptachlor and heptachlor epoxide in soil, as can the amount of organic matter present.
- Heptachlor and heptachlor epoxide are also taken up by plants and both may bioconcentrate in aquatic and terrestrial food chains.

Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute-, intermediate-, or chronic-duration inhalation MRLs were derived for heptachlor or heptachlor epoxide.

Oral

- An MRL of 0.0006 mg/kg/day has been derived for acute-duration oral exposure (<14 days) to heptachlor.
- An MRL of 0.0001 mg/kg/day has been derived for intermediate-duration oral exposure (15-364 days) to heptachlor.
- No chronic-duration oral MRL was derived for heptachlor.
- No acute-, intermediate-, or chronic-duration oral MRLs were derived for heptachlor epoxide.

Health Effects

- Oral exposure of laboratory animals to heptachlor results in a variety of adverse effects including liver effects, neurological effects, reproductive system dysfunction, and developmental effects.
- Although, there are very few studies involving exposure to heptachlor epoxide, it is likely that the effects resulting from heptachlor exposure are due to its metabolism to heptachlor epoxide.
- The reproductive system (decreased fertility and increased resorptions) appears to be the most sensitive target in mature animals exposed to heptachlor.
- Perinatal and postnatal exposure to heptachlor adversely affected the development of the nervous and immune systems. These effects occur at lower doses than effects in mature animals.
- The International Agency for Research on Cancer (IARC) classifies heptachlor as a possible human carcinogen. The EPA classifies heptachlor and heptachlor epoxide as probable human carcinogens.

Children's Health

- Children are likely to be more susceptible than adults to exposure to heptachlor and heptachlor epoxide.
- Impaired performance on tests of nervous system function was found in a small group of high school students found to have been exposed.