

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

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

ToxGuide™

for

Toxaphene

$C_{10}H_{10}Cl_8$
(approximately)

CAS# 8001-35-2

October 2014

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

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General Populations

- Exposure to the general population is expected to be low since toxaphene is no longer used as an insecticide in the United States.
- People living near a location with heavy toxaphene contamination, such as a hazardous waste site, may be exposed to higher levels through breathing contaminated air or through direct skin contact with contaminated soil or water.
- People who eat large quantities of fish, shellfish, or wild game animals from areas contaminated with toxaphene may have higher exposure to this substance since these animals tend to accumulate toxaphene in fatty tissues.
- Individuals may be exposed to toxaphene through drinking water contaminated with runoff from toxaphene-contaminated soils.

Occupational Populations

- The processing or use of toxaphene at industrial facilities is low and is expected to be related to the storage and disposal of toxaphene supplies or the use of this substance in onsite processing and as a manufacturing aid. These facilities are not expected to be involved in production or import of toxaphene for pesticidal use in the United States.

Toxicokinetics

- Toxaphene can be readily absorbed from the gastrointestinal tract and lung; dermal absorption has been demonstrated as well.
- Available animal data indicate a high affinity of toxaphene for adipose tissue; other organs and tissues to which toxaphene and its breakdown products may be distributed include kidney, liver, muscle, and brain.
- Toxaphene is rapidly and extensively degraded in mammals via metabolic pathways that involve dechlorination, dehydrodechlorination, and oxidation. It appears that all toxaphene components undergo rapid metabolism, yet each component has its own rate of biotransformation.
- Most toxaphene and its breakdown products are eliminated through the feces; lesser amounts are excreted in the urine.

Normal Human Levels

- Toxaphene and its breakdown products are not likely to be found in significant concentrations in the general population because it is no longer used as an insecticide in the United States. However, persistent toxaphene congeners may be present in relatively high concentrations among populations consuming large quantities of toxaphene-contaminated fish or aquatic mammals.

Biomarkers

- Toxaphene and/or toxaphene residues in blood, fat samples, breast milk, feces, or urine.

Environmental Levels

Air

- Measured ambient air levels of toxaphene and persistent congeners range from not detectable to 42 pg/m³.

Water

- Toxaphene in surface waters generally ranged from not detectable to 7 ppb. Toxaphene was not detected in most drinking water samples.

Soil

- Toxaphene was detected in soil and sediment at up to 2.5 ppb (dry weight) in agricultural areas since being banned.

Food

- Since its ban, toxaphene has infrequently been found at low levels in food items. Levels up to 2.4 ppb were measured in fish and shellfish from aquatic regions where toxaphene persists.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2014. Toxicological Profile for Toxaphene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

Toxaphene is a Solid

- Toxaphene is a yellowish-colored insecticide composed of a complex mixture of at least 670 chlorinated terpenes. Toxaphene has a piney, chlorine- and camphor-like odor
- Toxaphene has been banned for all registered uses in the United States since 1990.

Toxaphene in the Environment

- Airborne toxaphene vapor would readily degrade via photochemically-produced hydroxyl radicals; toxaphene particulates would persist and be subject to long-range transport.
- Toxaphene in water would tend to adsorb to suspended particles and sediments; this would limit its mobility, volatilization from water surfaces, susceptibility to photolysis, and biodegradation.
- In soils and sediments, toxaphene would adsorb to particles and be relatively immobile; it would readily degrade under anaerobic conditions, but could persist for many years under aerobic conditions.
- Toxaphene bioconcentrates significantly in aquatic organisms and appears to be biomagnified in aquatic food chains.
- The composition of toxaphene in the environment changes over time because congeners of toxaphene degrade at different rates; such toxaphene is called “weathered toxaphene.”

- Inhalation – There is some potential for inhalation exposure among populations living near waste sites that contain toxaphene and its degradation products.
- Oral – Potential routes of exposure are via consumption of food sources (e.g., fish and aquatic mammals) that contain toxaphene residues, or via toxaphene-contaminated drinking water.

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 toxaphene.

Oral

- An acute-duration (≤ 14 days) oral MRL of 0.05 mg/kg/day was derived for toxaphene.
- An intermediate-duration (15-364 days) oral MRL of 0.002 mg/kg/day was derived for toxaphene.
- No chronic-duration (≥ 365 days) oral MRL was derived for toxaphene.

Health Effects

- Clinical signs of nervous system stimulation (e.g., convulsions) were seen in people during acute toxaphene poisoning. Tissue damage to nervous system, liver, kidneys, and thyroid gland, and evidence of effects on the immune system (e.g., decreased serum IgM levels) were observed in toxaphene-treated laboratory animals.
- EPA concluded that toxaphene is a “probable human carcinogen”. The International Agency for Research on Cancer (IARC) considers toxaphene to be “possibly carcinogenic to humans.” The National Toxicology Program (NTP) considers toxaphene “reasonably anticipated to be a human carcinogen.” The cancer classifications are based on findings of hepatocellular tumors in mice, thyroid tumors in rats, and evidence of mutagenicity in *in vitro* bacterial assays.

Children’s Health

- Children exposed to toxaphene would be expected to experience effects similar to those expected in adults.
- Selected toxaphene congeners have been detected in human breast milk.
- The potential for toxaphene-induced developmental effects in humans has not been adequately evaluated. Limited developmental studies in animals had equivocal results regarding minor developmental toxicity.