Technical Factsheet on: TOXAPHENE

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
MCLG: zero mg/L
MCL: 0.003 mg/L
HAL(child): none

Health Effects Summary

Acute: EPA has found toxaphene to potentially cause the following health effects from acute exposures at levels above the MCL: central nervous system effects including restlessness, hyperexcitability, tremors, spasms or convulsions.

EPA has not set drinking water levels which are considered "safe" for short-term exposures.

Chronic: Toxaphene has the potential to cause the following health effects from long-term exposures at levels above the MCL: liver and kidney degeneration; central nervous system effects; possible immune system suppression.

Cancer: There is some evidence that toxaphene may have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

Production of toxaphene in 1977 was nearly 40 million pounds. By 1982, when EPA cancelled most of its uses, consumption was reported at 12 million pounds.

Toxaphene was used as an insecticide for cotton (50%), vegetables (17%), livestock and poultry (17%), soybeans (12%), alfalfa, wheat and sorghum (5%).

All formulations are now Restricted Use Pesticides. Special livestock formulations are available & recommended for the control of scab mites or mange on livestock. Rigo Toxaphene 6 has been registered for sicklepod control in AL, GA, MS, AR, NC, SC, & TN as 24(C) registrations for special local needs. Strobane T-90 has a broad spectrum activity as stomach & contact residual insecticide, & it has shown activity against several species of worms, scab, mites, hornflies, lice & mealybugs & major cotton insects. In the past, it has been used as piscicide (fish toxicant) in lakes.

Other minor uses: for armyworms, cutworms, & grasshoppers; for mealybug & pineapple gummosis moth control on pineapples & weevil control on bananas. Conditional and restricted use as an insecticide and as a miticide in foliar treatment of: cranberries, strawberries, apples, pears, quinces, nectarines, peaches, bananas, pineapple, eggplant, peppers, pimentos, tomatoes, broccoli, brussel sprouts, cabbage, cauliflower, collards, kale, kohlrabi, spinach, lettuce (head and leaf), parsnips, rutabagas, beans (lima, green and snap), corn (sweet), cowpeas, okra, alfalfa, barley, oats, rice, rye, wheat, celery, cotton, horseradish, peanuts, peas, sunflowers, soybeans, ornamental plants, birch, elm, hickory, maple oak, and noncrop areas. Also used in seed crop foliar treatment of clover and trefoil; in soil treatment of corn; in back rubber of beef cattle; in animal treatment of goats, sheep, beef cattle, and hogs; and aerial application and tank mixtures.

Release Patterns

Toxaphene is released into the environment primarily from its application as an insecticide for the protection of cotton, mostly in southern states.

Environmental Fate

Toxaphene is very persistent. When released to soil it will persist for long periods (1 to 14 yr), is not expected to leach to groundwater or be removed significantly by runoff unless adsorbed to clay particles which are removed by runoff. In water it will not appreciably hydrolyze, photolyze, or significantly biodegrade. It will strongly sorb to sediments.

Little information concerning biodegradation of toxaphene in aquatic systems was found in the literature. However, it has been reported that the detoxification of toxaphene was due to adsorption rather than by degradation in 8 Wisconsin lakes. Degradation in aquatic sediment was more significant under anaerobic than aerobic conditions and oxidative as well as reductive metabolism can be important in the degradation of toxaphene. Anaerobic conditions in sediments led to nearly 50% overall degradation of 3 main components of toxaphene; under aerobic conditions 13.6% degradation of the 3 components was observed. Toxaphene is resistant to degradation in soils with reported half-lives ranging from 0.8 yr to 14 yr. 50% loss in 6 weeks due to biological transformation in anaerobic, flooded soils was reported while no transformation was found in aerobic sediments.

Evaporation from soils and surfaces will be a significant process for toxaphene. Based on range of reported Henry's Law constants the calculated range of the half-life for evaporation of toxaphene from a model river is 6.0-6.3 hr. Although toxaphene is strongly adsorbed to soil, evaporation from soils may be a significant process. Evaporation losses of from 7 to 14 kg/ha/yr or more have been estimated from loam soil under annual rainfall of 150 cm. Field studies have shown it to be detoxified rapidly in shallow and very slowly in deep bodies of water.

Toxaphene may undergo very slow direct photolysis in the atmosphere. However vapor phase reactions with photochemically produced hydroxyl radicals should be more important fate process (estimated half-life 4-5 days). Toxaphene can be transported long distances in the air (1200 km) probably adsorbed to particular matter.

Bioconcentration factors (BCF) for fish - 3100 to 69,000; for shrimp 400-1200; Algae - 6902; snails - 9600. These BCF values indicated significant bioconcentration potential. Chickens fed 5, 50, or 100 ppm toxaphene in the diet, residues are detected in eggs and adipose tissue with a BCF of about 5. Monitoring data demonstrates that toxaphene is a contaminant in some air, water, sediment, soil, fish and other aquatic organisms, foods and birds. Human exposure appears to come mostly from food or occupational exposure.

Chemical/ Physical Properties

CAS Number: 8001-35-2

Color/ Form/Odor: Amber waxy solid with a piney odor; a mixture of polychlorinated compounds, available as a dust, wettable powder, or as emulsifiable or oil solutions

M.P.: 65-90C B.P.: Decomposes

Vapor Pressure: 0.4 mm Hg at 25 C

Octanol/Water Partition (Kow): Log Kow = 3.3

Density/Spec. Grav.: 1.65 at 25 C

Solubility: 3 mg/L of water at 22 C; Slightly soluble in water

Soil sorption coefficient: Koc = 2.1x105; very low mobility in soil

Odor/Taste Thresholds: Odor threshold in water is 0.14 mg/L

Bioconcentration Factor: BCFs of 3100 to 69,000 in fish; high potential to bioconcentrate in aquatic organisms.

Henry's Law Coefficient: 0.063 to 0.005 atm-cu m/mole; will volatilize from water/soil

Trade Names/Synonyms: Chlorinated camphene, Octachlorocamphene, Camphochlor, Agricide Maggot Killer, Alltex, Crestoxo, Compound 3956, Estonox, Fasco-Terpene, Geniphene, Hercules 3956, M5055, Melipax, Motox, Penphene, Phenacide, Phenatox, Strobane-T, Toxadust, Toxakil, Vertac 90%, Toxon 63, Attac, Anatox, Royal Brand Bean Tox 82, Cotton Tox MP82, Security Tox-Sol-6, Security Tox-MP cotton spray, Security Motox 63 cotton spray, Agro-Chem Brand Torbidan 28, Dr Roger's TOX-ENE

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 detect at > 0.001 mg/L

Analysis:

Reference Source	**Method Numbers**
EPA 600/4-88-039	505; 508; 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