Technical Factsheet on: 1,2-DICHLOROETHANE

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: 0.005 mg/L
HAL(child): 1- to 10-day: 0.7 mg/L; Longer-term: 0.7 mg/L

Health Effects Summary

Acute: EPA has found acute oral exposures to 1,2-dichloroethane to potentially cause central nervous system disorders, and adverse lung, kidney, liver circulatory and gastrointestinal effects.

Drinking water levels which are considered "safe" for short-term exposures: For a 10-kg (22 lb.) child consuming 1 liter of water per day: upto a 7-year exposure to 0.7 mg/L.

Chronic: No reliable data are available concerning toxic effects from chronic exposures to 1,2-dichloroethane at levels above the MCL.

Cancer: There is some evidence that 1,2-Dichloroethane may have the potential to cause cancer from a lifetime exposure at levels above the MCL.

Usage Patterns

Production of 1,2-dichloroethane has increased steadily: from about 14 billion lbs. in 1990 to 18 billion lbs. in 1993. In 1985 it was estimated that industries consumed 1,2-dichloroethane as follows: Vinyl chloride monomer, 97%; chlorinated solvents, 2%; miscellaneous, 1%.

The greatest use of 1,2-dichloroethane is in chemical manufacture, including: vinyl chloride, tri- & tetra-chloroethylene, vinylidene chloride & trichloroethane, ethylene glycol,

diaminoethylene, polyvinyl chloride, nylon, viscose rayon, styrene-butadiene rubber, and various plastics; as a lead scavenger in gasoline.

1,2-dichloroethane has a variety of uses as a solvent uses: for resins, asphalt, bitumen, rubber; for fats, oils, waxes, gums resins; used as pickling agent and a dry clean agent; in photography, xerography, water softening & in production of cosmetics; for processing pharmaceutical products; in leather cleaning, degreaser compounds, rubber cement, and acrylic adhesives. It is also used in extracting spices such as annatto, paprika & turmeric.

Other uses include as a fumigant for harvested grain, in orchards, in mushroom houses; fumigant for upholstery and carpets.

Release Patterns

Major atmospheric releases of 1,2-dichloroethane are due to its production and use as a chemical intermediate, lead scavenger, extraction and cleaning solvent, diluent for pesticides, grain fumigant and in paint, coatings and adhesives. Other releases are from waste water, spills, and/or improper disposal primarily from its use as a cleaning solvent and chemical intermediates. Land release is primarily from its production and use as a cleaning solvent and diluent for pesticides. Chlorination of water does not appear to contribute to 1,2-dichloroethane in drinking water.

From 1987 to 1993, according to the Toxics Release Inventory, releases to water totalled over 433,000 lbs. Release to land totalled over 22,000 lbs. These releases were primarily from facilities classified as producing industrial organic chemicals, alkalies and chlorine. The largest releases occurred in New Jersey and Louisiana.

Environmental Fate

Releases to water will primarily be removed by evaporation (half-life several hours to 10 days). Although firm experimental data are lacking, the photooxidation of 1,2-dichloroethane in water is expected to be slow. The rate of hydrolysis is not significant, being much slower than other pertinent environmental processes such as volatilization and photooxidation.

Releases on land will dissipate by volatilization to air and by percolation into groundwater where it is likely to persist for a very long time. Little adsorption to soil is expected based upon an experimental Koc of 33 for silt loam which in agreement with values calculated from the water solubility. 1,2-Dichloroethane rapidly percolates through sandy soil.

Once in the atmosphere, it may be transported long distances and is primarily removed by photooxidation (half-life approx 1 month). The direct photolysis of 1,2-dichloroethane is not a significant loss process. It is primarily degraded in the atmosphere by reaction with hydroxyl radicals, having a half-life of a little over a month with a 1.9% loss for a 12 hour sunlit day. Indirect evidence for photooxidation of 1,2-dichloroethane comes from the observation that monitoring levels are highest during the night and early morning. The products of photooxidation are CO_2 and HCl.

Biodegradability tests with 1,2-dichloroethane resulted in little or no biodegradation in aerobic systems using sewage seed or activated sludge. The one river die-away test reported no degradation. The percent BOD produced in 5-10 days was 0-7%. Another investigator reported slow to moderate biodegradation activity. The extent of biodegradation is difficult to assess due to compounds' susceptibility to volatilization. No degradation occurred in an acclimated anaerobic system after 4 months incubation.

1,2-Dichloroethane is not expected to bioconcentrate in fish due to its low octanol/water partition function (1.48). The measured log BCF in bluegill sunfish is 0.30. Its presence in some food products is probably due to its use as an extractant. Major human exposure is from urban air, drinking water from contaminated aquifers and occupational atmospheres.

Chemical/Physical Properties

CAS Number: 107-06-2

Color/ Form/Odor: Colorless, oily liquid with a pleasant, sweet, chloroform-like odor

M.P.: N/A B.P.: N/A

Vapor Pressure: N/A; highly volatile

Density/Spec. Grav.: 1.235 at 20 C

Octanol/Water Partition (Kow): Log Kow = 1.48

Solubilities: 8.7 g/L of water at 20 C;

Soil sorption coefficient: Koc measured at 33 for silt/loam; high to very high mobility in soil

Odor/Taste Thresholds: Taste threshold in water is 29 mg/L

Bioconcentration Factor: Log BCF is 0.30 in fish; not expected to bioconcentrate in fish.

Henry's Law Coefficient: N/A

Trade Names/Synonyms: 1,2-Ethylene dichloride; Glycol dichloride; Freon 150; Borer sol; Brocide; Destruxol borer-sol; Dichlor-mulsion; Dutch oil; Granosan

Other Regulatory Information

Monitoring:

--For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years

Repeat Frequency- Annually after 1 year of no detection

--Triggers - Return to Initial Freq. if detect at > 0.0005 mg/L

Analysis

Reference Source	Method Numbers
EPA 600/4-88-039	502.2; 524.2

Treatment/Best Available Technologies: Granular Activated Charcoal and Packed Tower Aeration

Toxic Release Inventory - Releases to Water and Land, 1987 to 1993 (in pounds):

	Water	Land
TOTALS (in pounds)	433,056	22,616

Top Six States*

NJ	192,700	231
LA	136,508	2,292
TX	36,459	7,028
MO	6,786	8,730
NY	11,330	0
KY	10,309	0

Major Industries

Industrial organics	211,146	363
Alkalies, chlorine	120,283	3,254
Cyclic crudes, intermed.	32,945	119
Agricultural chemicals	11,918	8,980
Industrial gases	15,497	0
Plastics materials, resins	6,908	6,895

Photographic equip.	11,566	0
Other Chemicals	8,179	0
Pharmaceuticals	7,525	521
Petroleum refining	1,730	1,479

* Water/Land totals only include facilities with releases greater than a certain amount - usually 1000 to 10,000 lbs

For Additional Information

EPA can provide further regulatory or 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