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# Chemical Fact Sheets

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Decane, C<sub>10</sub>H<sub>22</sub>  
CAS No. 124-18-5

## WHAT IS DECANE?

Decane is a colorless liquid.

## USES

Decane's uses include organic synthesis, solvent, and the standardization of aircraft engine carburetors. It is also used in the calibration of jet engine nozzles and in jet fuel research.

## SOURCES

Decane is a constituent in the paraffin fraction of crude oil and natural gas. It is released to the environment via the manufacture, use, and disposal of many products associated with the petroleum and gasoline industries. Extensive data show release of n-Decane into the environment from solvent based building materials, printing pastes, paints, varnishes, adhesives and other coatings, landfills and waste incinerators, vulcanization and extrusion operations during rubber and synthetic production, and the combustion of gasoline, fuels, and plastics.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Decane might include:

- Breathing low background levels in the environment. This is the most probable route of human exposure. Breath samples have demonstrated exposure among urban residents. Extensive monitoring data indicates that n-Decane is a widely occurring atmospheric pollutant.
- Breathing higher levels of contaminated air in the workplace or from using products containing it.
- Breathing exhaust fumes from motor vehicles. The ground level concentration in a car park may be 140 µg/m<sup>3</sup>, on a motorway 1,060 µg/m<sup>3</sup>.

### Annual Averages of Ambient Levels of Decane in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	0.5395	0.5127
Edmonton Central	3.2096	3.8826
Edmonton East	0.6237	0.9039

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Breakdown of n-decane may occur in soil and water, but evaporation and binding to soil are considered more important.
- It binds strongly to soil and may attach itself to suspended particles in water.
- It may build up in the bodies of aquatic animals.
- It is expected to exist almost entirely as a vapor in air.

## TOXICITY

Effects of Decane on human health and the environment depend on how much Decane is present and the length and frequency of exposure. Effects also depend on the health of a person or the condition of the environment when exposure occurs.

- If you breathe it or touch it, it may irritate or burn your skin and eyes.
- Decane may cause suffocation in high concentrations, and may lessen the activity in the brain and spinal cord.
- It is considered relatively nontoxic.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		10,000			1,000
Ontario		60,000			

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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DEHP, Di(2-ethylhexyl)phthalate, C<sub>24</sub>H<sub>38</sub>O<sub>4</sub>

CAS No. 117-81-7

## WHAT IS DEHP OR DI(2-ETHYLHEXYL)PHTHALATE?

Di(2-ethylhexyl)phthalate is a manufactured chemical that makes plastic more flexible. It is also called DEHP. DEHP is a colorless liquid with almost no odor. Trade names for DEHP are Platinol DOP, Octoil, Silicol 150, Bisoflex 81, and Eviplast 80.

## USES

DEHP is used in the manufacture of polyvinyl chloride (PVC) plastic products such as toys, vinyl upholstery, shower curtains, adhesives, and coatings. It is also used in inks, pesticides, cosmetics, and vacuum pump oil. It is used to detect leaks in protective face gear, and as a test material for filtration systems.

## SOURCES

There are no natural sources of DEHP. Concentrations of DEHP in the environment are normally a result of emissions during the manufacturing process. Plastics containing DEHP can be a source to the environment if allowed to degrade in landfills or as litter.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to DEHP might include:

- Use of medical products packaged in plastic such as blood products.
- Ingestion of some foods packaged in plastics, especially fatty foods like milk products, fish and seafood, and oils.
- Drinking well water near waste sites.
- Breathing workplace air or indoor air where DEHP is released (from plastic materials, coatings, and flooring).
- Fluids from plastic intravenous tubing if used extensively as for kidney dialysis.

Exposure to DEHP by the above-noted routes is normally associated with low concentrations.

Ambient air concentrations of DEHP were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- DEHP evaporates into air and dissolves into water at very low rates.
- It attaches strongly to soil particles.
- Small organisms in surface water or soil break it down into harmless compounds.
- DEHP does not break down easily in deep soil, or in lake or river bottoms.
- DEHP is often found in plants, fish, and other animals; however, animals high on the food chain are able to break it down, resulting in lower tissue concentrations.

## TOXICITY

- Adverse effects in animals were generally seen only at high doses or with long term exposures. There is currently very little data regarding the toxicity of DEHP to humans.
- DEHP can not be taken up easily through the skin, and is therefore of little concern from this exposure pathway.
- The US Department of Health and Human Services has determined that DEHP may reasonably be anticipated to be a carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		50			5
Ontario	100			50	

Adapted from:

DEHP ToxFAQs. Agency for Toxic Substances and Disease Registry. <http://www.atsdr.cdc.gov/toxfaq.html>.

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# Chemical Fact Sheets

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Dicamba, C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>3</sub>  
CAS No. 1918-00-9

## WHAT IS DICAMBA?

Dicamba is a pale, odorless, crystalline herbicide.

## USES

There are approximately 87 products containing dicamba registered for use in Canada. Dicamba is used for broadleaf weed control in turf areas, on cropland and for brush and weed control on non-crop areas.

## SOURCES

Herbicidal application of dicamba releases the compound directly to the environment and is therefore the primary environmental emission source. Dicamba is found frequently in summer precipitation samples in Alberta, with some water samples having levels exceeding Canadian Irrigation Water Guidelines.

Sales of dicamba in 1998 in Alberta totaled 138,290 kg active ingredient.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Average ambient levels in air measured in 1999 were 0.0016 ng/m<sup>3</sup> (for 4 sites).

Exposure to Dicamba might include:

- Breathing Dicamba dust while using it or products that contain it.
- Breathing it or touching it in the workplace if you are involved in its manufacture, formulation and application.
- Drinking contaminated water.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Dicamba is released directly to the environment by its application as a herbicide.
- It is broken down easily by microorganisms in soil and water.

- Removal from water occurs primarily through the break down by water microorganisms and reaction with sunlight.
- It does not bind strongly to soils. It binds more strongly to soils that are acidic than soils that are basic.
- It can move into groundwater.
- In soil, about one-half of the total amount breaks down every 4 to 555 days, with the typical length of time being 1 to 4 weeks)
- It will remain significantly longer in soils that are dry compared to soils that are wet.
- In air, it remains in vapour form or sticks to particles in the air. About one-half of the total amount of vapour is thought to break down from chemicals generated in the presence of sunlight, every 6 days.
- Dicamba that is stuck to particles in the atmosphere will move to soil or water as

## TOXICITY

- Dicamba is slightly toxic by ingestion and slightly toxic by inhalation or dermal exposure
- In some individuals dicamba is a skin sensitizer and may cause skin burns, but there is no evidence that dicamba is absorbed through the skin
- Appetite loss, weight loss, vomiting, depression, muscular weakness, and even death may occur if exposed to sufficient quantities.

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.  
Extoxnet, Pesticide Information Profiles. Dicamba. 1996

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# Chemical Fact Sheets

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## 1,4-Dichlorobenzene, C<sub>6</sub>H<sub>4</sub>Cl<sub>2</sub> CAS No. 106-46-7

### WHAT IS 1,4-DICHLOROBENZENE?

1,4-Dichlorobenzene is a white or colorless solid at room temperature with a strong, pungent odor that can be detected at very low concentrations. When exposed to air, it slowly changes from a solid to a vapor. Other names include para-DCB (or p-DCB), Paramoth, para crystals and paracide.

### USES

1,4-Dichlorobenzene is used to control moths (in the form of mothballs), molds and mildew, and to deodorize restrooms and waste containers.

### SOURCES

Most 1,4-Dichlorobenzene in our environment comes from its use in moth repellent products and in toilet deodorizer blocks. There are no natural sources of 1,4-Dichlorobenzene.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,4-Dichlorobenzene might include:

- Breathing indoor air in public restrooms and homes that use 1,4-Dichlorobenzene as a deodorizer.
- Breathing air around some mothballs (check the label).
- Breathing workplace air where 1,4-Dichlorobenzene is manufactured.
- Drinking contaminated water around hazardous waste sites.
- Eating foods such as pork, chicken, and eggs that are contaminated with 1,4-Dichlorobenzene from its use as an odor control product in animal stalls.
- Eating fish from contaminated waters.
- Drinking human breast milk from mothers exposed to 1,4-Dichlorobenzene.

#### Annual Averages of Ambient Levels of 1,4-Dichlorobenzene in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	0.1933	0.1787
Edmonton Central	0.1410	0.1345
Edmonton East	0.0572	0.0688

## ENVIRONMENTAL FATE AND BEHAVIOUR

- In air, 1,4-Dichlorobenzene breaks down to harmless products in approximately one month.
- It does not dissolve easily in water.
- It evaporates readily from water and soil.
- It is not easily broken down by soil organisms.
- It is taken up and retained by plants and fish.

## TOXICITY

- There is no evidence that moderate use of common household products containing 1,4-Dichlorobenzene will result in harmful health effects.
- Very high usage of 1,4-Dichlorobenzene products in the home can result in dizziness, headaches, and liver problems.
- High levels of 1,4-Dichlorobenzene in the workplace may result in painful irritation of the nose and eyes.
- Ingestion of p-DCB products may lead to development of skin blotches and a decrease in the number of red blood cells.
- Animal studies indicate that breathing or eating p-DCB can harm the liver, kidney, and blood.
- The Department of Health and Human Services has determined that 1,4-Dichlorobenzene may reasonably be anticipated to be a carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas					
Ontario	285			95	

Adapted from:

1,4-Dichlorobenzene ToxFAQs. Agency for Toxic Substances and Disease Registry.  
<http://www.atsdr.cdc.gov/toxfaq.html>.



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# Chemical Fact Sheets

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## 2,4-Dichlorophenoxyacetic acid (2,4-D), C<sub>8</sub>H<sub>6</sub>Cl<sub>2</sub>O<sub>3</sub> CAS No. 94-75-7

### WHAT IS 2,4-DICHLOROPHENOXYACETIC ACID?

2,4-Dichlorophenoxyacetic acid (2,4-D) occurs as a white to yellow crystalline powder, which is odorless when pure.

### USES

There are approximately 300 registered products containing 2,4-D, including herbicides in solutions, dispersions or emulsions in water and/or oil. Various 2,4-D esters, salts and mixtures with other herbicides have been marketed by many companies over the past 40 years. A sequestering agent is included in commercial formulations to prevent precipitation of calcium or magnesium salts by hard water.

### SOURCES

There are no natural sources of 2,4-D. It is produced commercially by the chlorination of phenol to form 2,4-dichlorophenol, which reacts with monochloroacetic acid to form 2,4-dichlorophenoxyacetic acid. Primary sources include chemical plants involved in the manufacture of 2,4-D and land to which it has been applied as a herbicide.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 2,4-D might include:

- Breathing or coming in contact with 2,4-D compounds, such as herbicides, in a working environment.
- Breathing or coming in contact with 2,4-D compounds as a result of working or living near fields sprayed and treated with 2,4-D compounds.
- Ingestion of contaminated food products and drinking water.

Ambient air concentrations of 2,4-Dichlorophenoxyacetic acid were not reported in 1997 or 1998 in Alberta.

### ENVIRONMENTAL FATE AND BEHAVIOUR

- If released on land, 2,4-D readily biodegrades (typical half-lives <1 day to several weeks).
- Adsorption to soils depends upon organic content and pH of the soil.

- Leaching to groundwater is commonly a significant process in coarse-grained sandy soils with low organic content or in very basic soils.
- If released to water, 2,4-D biodegrades (typical half-lives are from 10 to >50 days). It is more persistent in oligotrophic waters and where high concentrations are released.
- It does not accumulate in aquatic organisms or appreciably absorb to sediments, especially at high pH values.
- If released in air, it is subject to photooxidation (estimated half-life of 1 day), gravitational settling of aerosols and rainout (due to its significant solubility in water).

## TOXICITY

- The potential for carcinogenicity of 2,4-D is real but very limited and not potent.
- Effects of contact or inhalation may be delayed.
- Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		10			1
Ontario					

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## 1,2-Dichloropropane

CAS No. 78-87-5

$C_3H_6Cl_2$

### WHAT IS 1,2-DICHLOROPROPANE?

1,2-Dichloropropane (also called Propylene Dichloride) is a colorless liquid with a sweet, Chloroform-like odor.

### USES

1,2-Dichloropropane is used for livestock (in dd mixture), solvent in plastics, resins, & metals industry, and as an intermediate in rubber processing and other chemical reactions. It is also an oil and fat solvent, is used in dry cleaning fluids, in degreasing, and in insecticidal fumigant mixtures.

### SOURCES

There are no natural sources of 1,2-Dichloropropane. Most 1,2-Dichloropropane in our environment is derived from its production and industrial applications. Another source is its application to agricultural lands as part of insecticidal fumigant mixtures.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,2-dichloropropane might include:

- Inhalation of 1,2-dichloropropane in ambient air.
- Drinking contaminated water.
- Inhalation and skin contact during its application as a soil fumigant or by being near fields within several days after treatment.
- Occupational exposure during its production and use.

Human exposure is primarily due to inhalation

#### Annual Averages of Ambient Levels of 1,2-dichloropropane in Alberta ( $\mu\text{g}/\text{m}^3$ )

Station	1999	2000
Calgary Central	0.0195	0.0375
Edmonton Central	0.0153	0.0369
Edmonton East	0.0227	0.0372

## ENVIRONMENTAL FATE AND BEHAVIOUR

- In the atmosphere, 1,2-Dichloropropane reacts with hydroxyl radicals and is washed out by rain.
- 1,2-dichloropropane remains in the atmosphere for sufficient time to disperse widely, as evidenced by its presence in ambient air.

## TOXICITY

- 1,2-dichloropropane may be toxic to humans if absorbed through the skin or inhaled.
- Inhalation or contact may irritate or burn skin and eyes.
- Vapours may cause dizziness or suffocation.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		1,150			115
Ontario					

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## 1,3-Dichloropropene, C<sub>3</sub>H<sub>4</sub>Cl<sub>2</sub> CAS No. 542-75-6

### WHAT IS 1,3-DICHLOROPROPENE?

1,3-Dichloropropene is a colorless liquid with a sweet smell. There are two forms of 1,3-Dichloropropene: cis-1,3-Dichloropropene and trans-1,3-Dichloropropene. These forms are very similar to each other and are usually combined in different amounts to form mixtures.

### USES

1,3-Dichloropropene is used mainly in farming to kill nematodes, which are pests that eat the roots of crops. It is often sprayed, undiluted, directly on the soils of vegetable and tobacco crops. Much smaller amounts are used to dissolve or to make other chemicals.

### SOURCES

1,3-Dichloropropene is a manufactured chemical that does not occur naturally in the environment. The primary source of 1,3-Dichloropropene in the environment is application to land as a pest controlling substance.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 1,3-Dichloropropene might include:

- Breathing contaminated air or coming in contact with it during crop treatment.
- Breathing contaminated workplace air or air around hazardous waste sites that contain it.
- Drinking contaminated water near where it is produced or used, or near hazardous waste sites that contain it.

#### Annual Averages of Ambient Levels of cis-1,3-Dichloropropene in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	0.0013	0.0005
Edmonton Central	0.0007	0.0005
Edmonton East	0.0019	0.0002

#### Annual Averages of Ambient Levels of trans-1,3-Dichloropropene in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	0.0092	0.0124
Edmonton Central	0.0066	0.0131
Edmonton East	0.0095	0.0111

## ENVIRONMENTAL FATE AND BEHAVIOUR

- 1,3-Dichloropropene rapidly evaporates from soil into the air, where it is broken down by sunlight.
- While in soil, it is often broken down by small organisms.
- It dissolves and breaks down slowly in water.
- It may reach underground water supplies, although it does not normally penetrate this deep.
- Other chemicals often found in hazardous waste sites may slow the breakdown of 1,3-Dichloropropene.
- It is not likely to bio-accumulate (most leaves the body within 2 days).

## TOXICITY

- Acute or chronic exposure (to high and low concentrations of 1,3-Dichloropropene, respectively) via inhalation may result in irritated skin, eyes, nose, and throat, and coughing, nausea, headache, and fatigue.
- Acute high level and chronic lower level studies in animals show damage to the nose and lung tissues.
- Animal studies have reported damage to the stomach lining, lung congestion, difficulty walking, and effects on the liver and kidneys from ingesting high levels of 1,3-Dichloropropene.
- Long-term dermal contact with pesticides that contained 1,3-Dichloropropene may cause increased sensitivity to further exposure.
- The US Department of Health and Human Services has determined that 1,3-Dichloropropene may be reasonably anticipated to be a carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		45			4.5
Ontario					

Adapted from:

1,3-Dichloropropene ToxFAQs. Agency for Toxic Substances and Disease Registry.  
<http://www.atsdr.cdc.gov/toxfaq.html>.

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# Chemical Fact Sheets

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## Dioxins (Chlorinated Dibenzo-p-Dioxins), CAS No. 1746-01-6

### WHAT ARE CHLORINATED DIBENZO-P-DIOXINS (CDDs)?

CDDs are a family of 75 chemically related compounds commonly known as dioxins. One of these compounds is called 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (2,3,7,8-TCDD); it is one of the most toxic of the CDDs and is the one most studied.

In the pure form, CDDs are crystals or colorless solids. CDDs enter the environment as mixtures containing a number of individual components. 2,3,7,8-TCDD is odorless, while the odors of the other CDDs are not known.

### USES

CDDs are not intentionally manufactured by industry except for research purposes. They are of no practical use in industrial operations.

### SOURCES

CDDs (mainly 2,3,7,8-TCDD) may be formed during the chlorine bleaching process at pulp and paper mills. They are also formed during chlorination by waste and drinking water treatment plants. They can occur as contaminants in the manufacture of certain organic chemicals. CDDs are released into the air in emissions from municipal solid waste and industrial incinerators.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Dioxins might include:

- Ingestion of meat, dairy products, and fish contaminated with CDDs makes up more than 90% of the intake of CDDs for the general population.
- Breathing low levels in air and drinking low levels in water.
- Dermal exposure to certain pesticides and herbicides.
- Chronic inhalation of contaminated air or ingestion of contaminated water from uncontrolled hazardous waste sites containing CDDs or incinerators releasing CDDs.
- Occupational exposure in industries involved in producing certain pesticides containing CDDs as impurities, pulp and paper mills, or incinerators.

Ambient air concentrations of Dioxins were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Some CDDs are very persistent in air and thus may be transported long distances, even around the globe.
- When released in waste waters, some CDDs are broken down by sunlight, while some evaporate to air; however, the majority attach to soil and settle to the bottom sediment in bodies of water.
- CDD concentrations may build up in the food chain, resulting in measurable levels in animals.

## TOXICITY

- Acute exposure to high-level concentrations of 2,3,7,8-TCDD and chronic exposure to low-level concentrations is often associated with the development of chloracne. Chloracne is a severe skin disease with acne-like lesions that occur mainly on the face and upper body. Other skin effects include rashes, discoloration, and excessive body hair.
- Exposure to high concentrations of CDDs may induce long-term alterations in glucose metabolism and subtle changes in hormonal levels.
- Exposure to lower levels of 2,3,7,8-TCDD in animals can cause a variety of effects such as weight loss, liver damage, and disruption of the endocrine system.
- The US Department of Health and Human Services has determined that 2,3,7,8-TCDD is known to cause cancer.

Adapted from:

Chlorinated Dibenzo-p-Dioxins ToxFAQs. Agency for Toxic Substances and Disease Registry.

<http://www.atsdr.cdc.gov/toxfaq.html>.



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# Chemical Fact Sheets

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Ethane, C<sub>2</sub>H<sub>6</sub>  
CAS No. 74-84-0

## WHAT IS ETHANE?

Ethane is a colorless gas which may be odorless or may have a mild gasoline-like odor.

## USES

Ethane is used in the production of ethylene by high temp thermal cracking, as a feedstock in the production of Vinyl Chloride, in the synthesis of chlorinated hydrocarbons, and as a refrigerant.

## SOURCES

Ethane is a highly volatile constituent in the paraffin fraction of crude oil and natural gas. Ethane gas is released to the environment via the manufacture, use and disposal of many products associated with the petroleum and natural gas industries. Extensive data show release of ethane into ambient air from waste incinerators and the combustion of gasoline, natural gas and polyethylene.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ethane might include:

- Inhalation of ambient air. Extensive monitoring data indicates ethane is a widely occurring atmospheric pollutant.

### Annual Averages of Ambient Levels of ethane in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	8.1410	8.1316
Edmonton Central	9.6436	9.6463
Edmonton East	14.2063	15.1066

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Biodegradation of ethane may occur in soil and water; however, volatilization is expected to be the dominant fate process. Adsorption may occur to a smaller degree.
- Ethane is moderately mobile in soil.
- In aquatic systems, ethane may partition from the water column to organic matter contained in sediments and suspended materials; however, volatilization is rapid from environmental waters.
- Ethane is expected to exist entirely in the vapor phase in ambient air. Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to occur (average half life of 52 days or greater).

## TOXICITY

- Ethane is considered to be physiologically and toxicologically inert. At high concentrations, ethane acts primarily as a simple asphyxiant by displacing oxygen from the blood and air.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		12,000			1,200
Ontario					

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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Ethyl acrylate, C<sub>5</sub>H<sub>8</sub>O<sub>2</sub>  
CAS No. 140-88-5

## WHAT IS ETHYL ACRYLATE?

Ethyl acrylate is a clear liquid with a penetrating, acrid odor. It was formerly used as an additive in food as a flavoring and fragrance. It occurs naturally in pineapple, and is also a component of certain cheeses.

## USES

Ethyl acrylate is used in the manufacture of emulsion polymers (for use in surface coatings), textiles, paper, polishes, leather and acrylic fibers.

## SOURCES

There are no natural sources of ethyl acrylate. The major source of ethyl acrylate in the environment is the manufacture of the above-noted materials, which may result in environmental releases via waste streams.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Ethyl acrylate might include:

- Occupational exposure through inhalation and dermal contact with the compound in workplaces where the compound is manufactured or used.
- Inhalation of air, ingestion of food, or dermal contact with this compound and other products (paper products, latex paints, etc.) containing it.

Ambient air concentrations of ethyl acrylate were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Ethyl acrylate will exist solely as a vapour in the ambient atmosphere, where they will be degraded by reaction with hydroxyl radicals produced in the presence of sunlight (estimated half-life 1.5 days) and by reaction with ozone (estimated half-life 2 days).
- Adsorption to soil occurs only to a small degree, and it can move easily into groundwater.
- Ethyl acrylate volatilizes readily from wet soil surfaces and water bodies and, to a lesser extent, from dry soil surfaces.
- Ethyl acrylate is broken down readily by microorganisms.
- It does not accumulate readily in the bodies of organisms.
- In water the rate at which it is broken down depends on the level of acidity in the water (half-life at pH 7 estimated at 3 years, at pH 8 estimated at 103 days, at pH 11 estimated at 2.5 hours).

## TOXICITY

- Ethyl acrylate may cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with the material may cause irritation and a burning sensation in the eyes.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		5			0.5
Ontario	4.5	4.5			

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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Ethylbenzene, C<sub>8</sub>H<sub>10</sub>

CAS No. 100-41-4

## WHAT IS ETHYLBENZENE ?

Ethylbenzene is a colorless liquid with a pungent, gasoline-like odor.

## USES

Ethylbenzene is used primarily in the production of styrene. It is also used as a solvent, as a constituent of asphalt and naphtha, and in fuels.

## SOURCES

Ethylbenzene will enter the atmosphere primarily from fugitive emissions and exhaust connected with its use in gasoline. More localized sources will be emissions, waste water and spills from its production and industrial use.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Ethylbenzene might include:

- Occupational exposure where petroleum products or byproducts are manufactured.
- Inhalation of ambient air under conditions of high atmospheric smog generated by motor vehicle emissions.
- Inhalation of cigarette smoke.
- Ingestion of contaminated drinking water.

### Annual Averages of Ambient Levels of Ethylbenzene in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	1.2325	1.3147
Edmonton Central	1.0063	1.2685
Edmonton East	0.7680	0.9825

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Atmospheric releases of ethylbenzene exist primarily as a vapor, and break down by reaction with hydroxyl radicals, which are produced by reaction with sunlight. The half-life is 0.5 to 2 days. It can partially return to the earth in rain.
- Releases into water are reduced by evaporation and breakdown by microorganisms. Estimates for the half-life in water are several days to 2 weeks.
- Some may adsorb to sediment surfaces in water bodies.
- Ethylbenzene is not expected to accumulate in the bodies of fish.

## TOXICITY

- Ethylbenzene may cause toxic effects if inhaled or absorbed through skin.
- Inhalation or contact with the material may irritate or burn skin and eyes.
- Inhalation of vapors may cause dizziness or suffocation.
- Chronic exposure to vapors may result in a variety of functional disorders, increase in deep reflexes, irritation of the upper respiratory tract and blood disorders.
- Aspiration of even a small amount may cause serious injury, as it can spread over a large surface of pulmonary tissue.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		2,000			
Texas		2,000			200
Ontario	1,400 1,900 (10-min)			1000	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## Ethylene dibromide, C<sub>2</sub>H<sub>4</sub>Br<sub>2</sub> CAS No. 106-93-4

### WHAT IS ETHYLENE DIBROMIDE?

Ethylene dibromide is a colorless liquid with a mild, sweet odor. Other names are EDB, 1,2-dibromoethane and glycol bromide. Trade names include Bromofume and Dowfume.

### USES

Ethylene dibromide has been used as a pesticide in soil, and on citrus, vegetable, and grain crops; however, these uses are becoming more restricted. Another major use was as an additive in leaded gasoline; however, since leaded gasoline is now banned, it is no longer used for this purpose. Uses today include treatment of logs for termites and beetles, control of moths in beehives, and as a preparation for dyes and waxes.

### SOURCES

Ethylene dibromide occurs naturally in small amounts in the ocean where it is formed by algae and kelp. However, the presence of ethylene dibromide in the environment is due primarily to its manufacture for the above-noted uses.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ethylene dibromide might include:

- Ingestion of contaminated water, especially well water near farms or waste sites.
- Inhalation of contaminated workplace air.
- Dermal contact when using ethylene dibromide or from bathing or swimming in contaminated water.

#### Annual Averages of Ambient Levels of Ethylene Dibromide in Alberta (µg/m<sup>3</sup>)

Station	1997	1998
Calgary Central	0.0121	0.0068
Edmonton Central	0.0132	0.0056
Edmonton East	0.0106	0.0048

### ENVIRONMENTAL FATE AND BEHAVIOUR

- When released, ethylene dibromide quickly volatilizes and will evaporate from surface water and soil to the air.
- It dissolves in water and will move through soil into the groundwater.

- Small amounts remain adsorbed to soil particles.
- It breaks down slowly in air (over 4-5 months), more quickly in surface water (2 months), and hardly at all in groundwater.
- It is not expected to accumulate in plants or animals.

## TOXICITY

- Ingestion of large amounts of ethylene dibromide may result in skin blisters and mouth and stomach ulcers.
- Occupational exposure via inhalation may result in reproductive abnormalities in human males.
- The US Department of Health and Human Services has determined that ethylene dibromide may reasonably be anticipated to be a carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		4			0.4
Ontario	9			3	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.



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# Chemical Fact Sheets

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## Ethylene dichloride, C<sub>2</sub>H<sub>4</sub>Cl<sub>2</sub> CAS No. 107-06-2

### WHAT IS ETHYLENE DICHLORIDE?

Ethylene dichloride is a clear chemical that has a pleasant smell and a sweet taste. It is also called 1,2-Dichloroethane.

### USES

The most common uses of ethylene dichloride today are the manufacture of vinyl chloride and other chemicals and as a solvent for grease, glue, and dirt. It has also been added to leaded gasoline to remove lead. In the past, ethylene dichloride was used in home products such as cleaning solutions and paint removers. It is rarely used in these products today.

### SOURCES

Ethylene dichloride is not found naturally in the environment. Its presence in the environment is primarily a result of its manufacture for the above-noted uses.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to ethylene dichloride might include:

- Breathing contaminated air in workplaces where it is used.
- Breathing contaminated air near factories where ethylene dichloride is made or used.
- Breathing contaminated air near hazardous waste sites that contain the chemical.
- Drinking water from contaminated wells.
- Breathing contaminated air when using cleaning products or other products that contain ethylene dichloride.

#### Annual Averages of Ambient Levels of Ethylene Dichloride in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	0.0787	0.0855
Edmonton Central	0.1289	0.1310
Edmonton East	0.1336	0.1693

### ENVIRONMENTAL FATE AND BEHAVIOUR

- Ethylene dichloride readily volatilizes during manufacture or use.
- It evaporates very quickly from surface water into the air.
- In air, it is readily broken down by sunlight.

- It slowly breaks down in water, and can therefore stay in groundwater for many years.
- In soil, it can be broken down within several months if methane is also present.

## TOXICITY

- Acute exposure to ethylene dichloride via inhalation or ingestion may result in damage to the heart, central nervous system, liver, kidneys, and lungs. The effects of chronic exposure are unknown.
- The US Department of Health and Human Services has determined that Ethylene dichloride may reasonably be anticipated to be a carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		160		16	4
Ontario	6			2	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## Ethylene oxide, C<sub>2</sub>H<sub>4</sub>O CAS No. 75-21-8

### WHAT IS ETHYLENE OXIDE?

Ethylene oxide is a colourless gas with a sweet, ether-like odor, similar to that of bruised apples.

### USES

Ethylene oxide is used as a ripening agent for fruits and a fungistat. It is also used as a fumigant for foodstuffs & textiles, as a component of organic synthesis and as agricultural fungicide. In Canada, ethylene oxide is registered for the control of bacteria and stored product insects in spices and natural seasonings. Ethylene oxide has also been used for sterilizing medical instruments, and articles in the patient care areas of hospitals.

### SOURCES

There are no natural sources of ethylene oxide. Ethylene oxide will primarily enter the environment in association with its production and use as a chemical intermediate as well as its relatively minor use for sterilizing and as a fumigant.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Ethylene oxide might include:

- Inhalation of air in the workplace, where ethylene oxide is manufactured or used.

### ENVIRONMENTAL FATE AND BEHAVIOUR

- Once in the atmosphere ethylene oxide will degrade very slowly by reaction with hydroxyl-radicals.
- Releases into water will be removed by volatilization, hydrolysis and to a lesser extent, biodegradation. Ethylene oxide does not accumulate in fish.
- Ethylene oxide will not adsorb strongly to soil.

## TOXICITY

- Ethylene oxide is toxic; it may be fatal if inhaled or absorbed through skin.
- Acute exposure via inhalation may cause nausea, vomiting, neurological disorders, and even death.
- The US Department of Health and Human Services has determined that ethylene oxide is a known human carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		15			
Texas		20			2
Ontario	15			5	

Adapted from:

ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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2-Ethylhexanol, C<sub>8</sub>H<sub>18</sub>O  
CAS No. 104-76-7

## WHAT IS 2-ETHYLHEXANOL?

2-Ethylhexanol is a colourless liquid with an odor reminiscent of rose.

## USES

2-Ethylhexanol is used in the process of mercerizing textiles and as a solvent for dyes, resins and oils. It is also used as a plasticizer for PVC resins and in solvent mixtures for nitrocellulose, paints, lacquers and baking finishes. 2-Ethylhexanol is an important chemical in the manufacturing of inks, rubber, paper and lubricants and in dry cleaning.

## SOURCES

2-Ethylhexanol is a plant volatile and may be released into air by natural processes. It is more commonly released to the environment as a constituent in air emissions or in wastewater as a result of its manufacture, transport, storage, disposal and use as a chemical intermediate in the manufacture of plasticizers and other chemicals.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to 2-Ethylhexanol might include:

- Occupational exposure to 2-Ethylhexanol via inhalation and dermal contact.
- The general population may be exposed to 2-Ethylhexanol by ingesting some fruits, in which it occurs naturally, and drinking water and also from indoor air.

Ambient air concentrations of 2-ethylhexanol were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- If released in soil, 2-ethylhexanol will leach and readily biodegrade. Some volatilization may also occur from both moist and dry soil.
- If released in water, 2-ethylhexanol will volatilize; the estimated half-life in a model river is 1.7 days.
- Adsorption to sediment and bio-concentration in fish are not expected to be important processes for 2-ethylhexanol.

- In the atmosphere, 2-ethylhexanol will occur as a vapor and react with photochemically produced hydroxyl radicals. Its estimated half-life in the atmosphere is 1.2 days.
- Since 2-ethylhexanol is moderately water soluble, it may be washed out of the atmosphere by rain.

## TOXICITY

- 2-ethylhexanol is moderately irritating to skin & slightly toxic when ingested.
- Symptoms of acute exposure may include headache, nausea, muscle weakness, giddiness, ataxia, confusion, delirium, and coma.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		600			
Texas					
Ontario		600			

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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Formaldehyde, CH<sub>2</sub>O

CAS No. 50-00-0

## WHAT IS FORMALDEHYDE?

Formaldehyde is a clear, very slightly acid gas or liquid with a pungent, irritating odor.

## USES

Formaldehyde is produced in large quantities primarily for use in the manufacture of resins and as a chemical intermediate. It is also used for disinfecting dwellings, ships, storage houses, utensils and clothes. Other uses include: as a germicide and fungicide for plants and vegetables; for destruction of flies and other insects; in the manufacture of artificial silk and cellulose esters, dyes, organic chemicals, glass mirrors and explosives.

Formaldehyde is also used for: improving fastness of dyes on fabrics; waterproofing fabrics; preserving and coating rubber latex; hardening gelatin plates and papers in photography; toning gelatin-chloride papers; chrome printing and developing; rendering casein, albumin and gelatin insoluble; preventing mildew and spelt in wheat and rot in oats; and as a fumigant.

Formaldehyde is used in the fixation of histological specimens and in alteration of bacterial toxins to toxoids for vaccines, as a germicide, and in wood-industry products, as a molding compound, foundry resins, adhesives for insulation, slow-release fertilizers, the manufacture of permanent-press finishes of cellulose fabrics, and formaldehyde-based textile finishes. Other applications include the manufacturing of fatty amides and in precious metal recovery, as a sewage treatment agent and as a chemical intermediate for other chemicals.

## SOURCES

Many of the industrial uses of formaldehyde do not result in releases to the environment, as the chemical is captive in these processes. Most formaldehyde entering the environment is produced directly or indirectly in combustion processes. Indirect production is derived from photochemical oxidation of hydrocarbons or other formaldehyde precursors that have been released from combustion processes. Cigarette smoke is also a source of formaldehyde.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to formaldehyde might include:

- Inhalation of ambient air in heavy traffic, particularly during photochemical smog episodes.

- Inhalation of air in the workplace where resins are used or where formaldehyde is used as a fumigant, disinfectant, embalming fluid, etc.
- Inhalation of indoor air, particularly in energy efficient homes, which can have high levels of formaldehyde from stoves, insulation, furniture, resin-coated rugs and other fabrics.

Ambient air concentrations of formaldehyde were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Formaldehyde is removed from the atmosphere by direct photolysis and oxidation by photochemically produced hydroxyl radicals (with a half-life of several hours).
- Additional quantities are removed by dry deposition, rain or by dissolution in the ocean and other surface waters. Biodegradation takes place in a few days in surface water bodies.

## TOXICITY

- The major toxic effects caused by acute formaldehyde exposure via inhalation are eye, nose, and throat irritation and effects on the nasal cavity. Other effects may be coughing, wheezing, chest pains, and bronchitis.
- Ingestion exposure to formaldehyde in humans has resulted in corrosion of the gastrointestinal tract and inflammation and ulceration of the mouth, esophagus, and stomach.
- Chronic exposure to formaldehyde by inhalation in humans has been associated with respiratory symptoms and eye, nose, and throat irritation.
- The US Department of Health and Human Services has determined that formaldehyde may reasonably be anticipated to be a carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		65			
Texas		15			1.5
Ontario	65			65	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.



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# Chemical Fact Sheets

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Glutaraldehyde, C<sub>5</sub>H<sub>8</sub>O<sub>2</sub>  
CAS No. 111-30-8

## WHAT IS GLUTARALDEHYDE?

Glutaraldehyde is a colorless liquid with a pungent odor.

## USES

Glutaraldehyde is used as an embalming fluid and for tissue fixation. It is an intermediate in reactions for cross-linking protein and polyhydroxy materials, and is used in the tanning of soft leathers. It is a chemical intermediate for adhesives, sealants, and electrical products. In the case of endoscopic instruments, thermometers, rubber or plastic equipment that can not be sterilized using heat, glutaraldehyde is employed. It is a biocide in the oil industry. Glutaraldehyde is also the most popular enzyme cross-linking reagent. It is cross-linked with microbial cells to yield cell pellets. Skin disinfectants are another application of this substance.

## SOURCES

Glutaraldehyde is found in the environment primarily as a result of its presence in waste streams from the above-noted uses.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to glutaraldehyde might include:

- Dermal contact through instrument sterilization; this type of exposure is common for health care workers.
- Exposure to liquid or vapours during tanning operations or chemical laboratory procedures.

Ambient air concentrations of glutaraldehyde were not reported in 1997 or 1998 in Alberta.

## TOXICITY

- Dermal contact with the liquid form can cause severe irritation of the eyes and skin.
- Inhalation of the vapour can cause irritation of the nose, throat and respiratory tract. Sensitized workers may be susceptible to asthma
- Exposure may cause nausea, headaches, drowsiness, dizziness, severe itching, skin rashes and eczema.

- Rat and mice studies do not show glutaraldehyde to be carcinogenic. It is unknown whether the compound is a human carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		2			0.2
Ontario	42	35		14	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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Glyphosate, C<sub>3</sub>H<sub>8</sub>NO<sub>5</sub>  
CAS No. 1071-83-6

## WHAT IS GLYPHOSATE?

Glyphosate is an odorless, white solid.

## USES

Glyphosate itself is an acid, but is commonly used in the salt form, most commonly as the isopropylamine salt. It is used as a non-selective, non-residual, post-emergence herbicide. As a herbicide, glyphosate is used to control a great variety of annual, biennial, and perennial plants. It is used in fruit orchards, vineyards, conifer plantations, and many plantation crops. Glyphosate is also used for pre-harvest weed control in canola, cereals, peas, beans, etc.

## SOURCES

Glyphosate does not occur naturally in the environment. Glyphosate is released to the environment in its use as a non-selective, post emergent herbicide for controlling woody and herbaceous weeds on forestry, right-of-way, cropped and non-cropped sites. It is applied as a spray of the isopropylamine salt.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Glyphosate might include:

- Inhalation and dermal contact during spraying, mixing, and cleanup of glyphosate in the workplace or during home gardening.
- Inhalation and dermal contact during glyphosate's manufacture, transport, storage, and disposal.

Ambient concentrations of glyphosate were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Glyphosate is removed from the atmosphere primarily by gravitational settling; it will occur in the atmosphere only as an aerosol and may degrade by photolysis.
- After glyphosate is applied to forests, fields, and other land by spraying, it is strongly adsorbed to soil, remains in the upper soil layers, and has a low propensity for leaching.

- Glyphosate readily and completely biodegrades in soil; however, biodegradation in foliage and litter is somewhat faster than in soil.
- Glyphosate may enter aquatic systems through accidental spraying, spray drift, or surface runoff. It dissipates rapidly from the water column as a result of adsorption and possibly biodegradation.
- Sediment is the primary sink for glyphosate.
- Glyphosate does not bio-concentrate in aquatic organisms or bio-accumulate in species in higher trophic levels.

## TOXICITY

- Glyphosate is practically non-toxic by dermal exposure.
- Glyphosate causes eye irritation upon exposure; some formulations may be more irritating than others.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		50			5
Ontario					

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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Heptane, C<sub>7</sub>H<sub>16</sub>  
CAS No. 142-82-5

## WHAT IS HEPTANE?

Heptane is a colorless liquid with a gasoline-like odor.

## USES

Heptane is a highly volatile constituent in the paraffin fraction of crude oil and natural gas. It is also used in the manufacture of printing pastes, paints, varnishes, adhesives and other coatings. Heptane is used as a research chemical.

## SOURCES

Heptane is released to the environment via the manufacture, use and disposal of many products associated with the petroleum and gasoline industries. Extensive data show release of heptane into the environment from landfills and waste incinerators, vulcanization and extrusion operations during rubber and synthetic production, and the combustion of gasoline fueled engines.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to heptane might include:

- Inhalation in occupational settings where heptane is manufactured, used or disposed of.
- Inhalation of ambient air, particularly near facilities where the manufacture, use or disposal of heptane is common.

Extensive monitoring data indicates heptane is a widely occurring atmospheric pollutant.

### Annual Averages of Ambient Levels of Heptane in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	0.8179	0.8584
Edmonton Central	0.8783	1.0708
Edmonton East	1.8138	2.2988

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Biodegradation of heptane may occur in soil and water; however, volatilization and adsorption are expected to be far more important fate processes. Heptane is slightly mobile to immobile in soil.
- In aquatic systems heptane may partition from the water column to organic matter in sediments and suspended solids. The bio-concentration of heptane may be important in aquatic environments.
- Heptane volatilizes rapidly from environmental waters.
- Heptane is expected to exist entirely in the vapor phase in ambient air.
- Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important (estimated half-life of 2.4 days).

## TOXICITY

- Inhalation may cause irritation or a burning sensation of the skin and eyes.
- Acute exposure via inhalation of vapors may cause dizziness or suffocation.
- Fire may produce irritating, corrosive and/or toxic gases.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		3,500			350
Ontario*	33,000			11,000	

\* Ontario standards for n-heptane

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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Hexane, C<sub>6</sub>H<sub>14</sub>  
CAS No. 110-54-3

## WHAT IS HEXANE?

Hexane is a colourless liquid. It is a highly volatile, widely occurring atmospheric pollutant.

## USES

Hexane is used in the determination of the refractive index of minerals and as a filling for thermometers. It is also used as: paint diluent; a solvent in extraction of soybean oil, cottonseed oil, flaxseed oil, safflower seed oil & other oil seeds; and a reaction medium in the manufacture of polyolefins, elastomers and pharmaceuticals. Hexane is also used as a denaturant for alcohol, a cleaning agent for the textile, furniture, and leather industries, and as a laboratory reagent. It is a component of many products associated with the petroleum and gasoline industries.

## SOURCES

The presence of hexane in the environment is most commonly due to emissions and waste streams from industries involved in the manufacture of the chemical. Spills and leaks during transport are also important sources.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to hexane might include:

- Inhalation in occupational settings where hexane is manufactured, used or disposed of.
- Inhalation of ambient air, particularly near facilities where the manufacture, use or disposal of hexane is common.

Annual Averages of Ambient Levels of Hexane in Alberta (µg/m<sup>3</sup>)

Station	1999	2000
Calgary Central	1.611	1.5524
Edmonton Central	1.7984	1.7798
Edmonton East	5.3218	6.3193

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Hexane is expected to exist entirely in the vapor phase in ambient air.
- Vapor phase reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important.

## TOXICITY

- Hexane acts as a mild central nervous depressant in acute exposures.
- Direct contact of hexane with the eye may cause pain and a dulling of the cornea. Damage appears to be scattered loss of epithelial cells due to solution of some of fats that occur in these cells.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		21,000		7,000	
Texas		5,300			200
Ontario (mixture)	7,500			2,500	
Ontario (n-hexane and isomers only)	22,500			7,500	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.



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# Chemical Fact Sheets

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Hydrazine, H<sub>4</sub>N<sub>2</sub>  
CAS No. 302-01-2

## WHAT IS HYDRAZINE?

Hydrazine is a colourless, fuming, oily liquid.

## USES

Hydrazine is produced and used as a chemical intermediate and reducing agent. It is also used rocket fuel and as a boiler water treatment agent.

## SOURCES

Hydrazine is produced naturally by certain bacteria during nitrogen fixation. Other important sources of hydrazine to the environment include emissions during the manufacture, use and disposal of the chemical in industrial processes. Hydrazine is also a constituent of cigarette smoke.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Hydrazine might include:

- Inhalation or dermal contact at workplaces where Hydrazine is produced or used.
- Inhalation of cigarette smoke or the ingestion of trace residues in processed foods.

Ambient air concentrations of hydrazine were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to the atmosphere, hydrazine will exist solely in the vapor phase in the ambient atmosphere.
- Hydrazine is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals and ozone.
- Release of hydrazine to soil is expected to result in degradation in soils containing a high percentage of organic carbon and in strong adsorption in soils containing high clay content. In other soils, especially sandy soils, hydrazine may have high mobility.
- Biodegradation is not expected to be an important environmental fate process in the presence of a large amount of hydrazine, due to its toxicity to microorganisms.
- Release of hydrazine to water should result in rapid degradation of Hydrazine, especially in water containing high concentrations of organic matter and dissolved oxygen.

- Bio-concentration in aquatic organisms may be an important fate process.

## TOXICITY

- Dermal contact with anhydrous hydrazine leads to caustic-like burns and dissolves hair.
- Toxic effects of hydrazine include conjunctivitis, pulmonary edema, anemia (hemolytic), ataxia, convulsions, kidney toxicity, and liver toxicity.
- Two reports of cancer mortality in workers exposed to Hydrazine have appeared in recent years.
- The US Department of Health and Human Services has determined that hydrazine can be reasonably anticipated to be a human carcinogen.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		0.13			0.013
Ontario					

Adapted from:

Hydrazine ToxFAQs. Agency for Toxic Substances and Disease Registry.

<http://www.atsdr.cdc.gov/toxfaq.html>.

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# Chemical Fact Sheets

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Hydrogen, H<sub>2</sub>  
CAS No. 1333-74-0

## WHAT IS HYDROGEN?

Hydrogen is a colourless gas that occurs abundantly in nature. It is extremely flammable.

## USES

Hydrogen is used in hot air balloons and dirigibles. The element is also used in the production of ammonia, methane and hydrogenated fats. Hydrogen is also used to separate metals from their oxides. Hydrogen has many applications in basic research laboratories. Certain isotopes of hydrogen are used in nuclear reactors.

## SOURCES

Hydrogen occurs chiefly in combination with oxygen in water, but it is also present in organic matter, such as living plants, petroleum and coal. It is present as a free element in the atmosphere at 1 ppm. Hydrogen from natural sources consists of more than 99.8% protium (hydrogen with atomic mass 1).

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to hydrogen may result from inhaling ambient air.

Ambient air concentrations of hydrogen were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Hydrogen reacts with oxygen in the atmosphere to form water.

## TOXICITY

- Vapors may cause dizziness or asphyxiation without warning. Some may be irritating if inhaled at high concentrations.

## OBJECTIVES AND GUIDELINES

Objectives or guidelines are not in place in Alberta, Texas, or Ontario.

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## Hydrogen sulphide, H<sub>2</sub>S CAS No. 7783-06-4

### WHAT IS HYDROGEN SULPHIDE?

Hydrogen sulphide is a colorless gas with a strong odor of rotten eggs.

### USES

Hydrogen sulphide is used in the production of elemental sulfur and sulfuric acid, as well as in the manufacture of heavy water and other chemicals. In addition, it is used as a disinfectant, as an additive in extreme pressure lubricants and cutting oils, and as an analytical reagent.

### SOURCES

Natural sources of hydrogen sulphide include sulfur springs, volcanic gas and natural gas. Industrial sources include: emissions from industrial paper plants; combustion of coal, fuel oil and natural gas (including gas flares); and emissions from sewers and waste treatment facilities. Cigarette smoke is also a source of hydrogen sulphide.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Hydrogen sulphide might include:

- Inhalation of gases from sulphur springs, volcanic gas and natural gas.
- Inhalation of ambient air in the vicinity of industrial paper plants using the kraft process.
- Inhalation of cigarette smoke; products from the combustion of coal, fuel oil and natural gas; ambient air in the vicinity of municipal sewers.
- Ingestion of water contaminated with Hydrogen sulphide.

### Annual Averages of Ambient Levels of Hydrogen Sulphide in Alberta (µg/m<sup>3</sup>)

Station	1997	1998
Calgary Central	No data	No data
Edmonton Central	No data	No data
Edmonton East	2	2

## ENVIRONMENTAL FATE AND BEHAVIOUR

- The residence time of hydrogen sulphide in the atmosphere is affected by ambient temperature and other atmospheric variables, including humidity, sunshine, and presence of other pollutants. The decreased temperatures and decreased levels of hydroxide in northern regions (e.g. Alberta, Canada) in winter increase the residence time of H<sub>2</sub>S in air.
- Once released into the atmosphere, hydrogen sulphide will behave like many other gaseous pollutants and be dispersed and eventually removed. Residence times in the atmosphere range from about one day to more than 40 days, depending upon season, latitude, and atmospheric conditions.

## TOXICITY

- Hydrogen sulphide is toxic and extremely hazardous. May be fatal if inhaled or absorbed through skin.
- Initial odor may be irritating or foul and may deaden one's sense of smell.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines (µg/m <sup>3</sup> )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		14		4	
Texas	114				
Ontario	30	30			

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## Iron, Fe

CAS No. 7439-89-6

### WHAT IS IRON?

Iron is a silvery-white or gray, soft, ductile, malleable metal that occurs naturally.

### USES

Iron is used in the manufacture of iron and steel castings (pig iron); of alloys with carbon, chromium, & other metals; and as a material to increase density of oil well drilling fluids. It is also used in tracer studies and was previously used in biological studies and as a catalyst.

### SOURCES

Iron is the 2nd most abundant metal in earth's crust after aluminum, at about 5%. Earth's core is believed to consist mainly of iron. Important ores include hematite ( $\text{Fe}_2\text{O}_3$ ), magnetite ( $\text{Fe}_3\text{O}_4$ ), limonite [ $\text{FeO}(\text{OH}) \cdot x\text{H}_2\text{O}$ ] & siderite ( $\text{FeCO}_3$ ).

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to iron might include:

- Mining & handling of iron ores, which result in exposure to dusts of iron oxides.
- Ingestion of naturally occurring levels in foods.
- Intake of supplements.

### TOXICITY

- Metallic iron foreign bodies in the cornea produce "rust ring" of yellow-brown staining. This phenomena is often associated with eye irritation and hyperemia of the conjunctiva.
- Long-term inhalation results in mottling of the lungs, a condition referred to as siderosis. This condition does not ordinarily cause significant physiologic impairment.
- Excessive consumption may cause lethargy, vomiting, diarrhea, hyperglycemia and leukocytosis (increased white blood cell count). Extreme cases may result in stupor, acidosis, hematemesis (vomiting blood), shock and coma.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas (as iron oxide)		50			5
Ontario (metallic)	10			4	

Adapted from:  
ChemBank HSDB, IRIS, RTECS toxicity profiles.

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# Chemical Fact Sheets

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## Isocyanates

CAS No. 71000-82-3

### WHAT ARE ISOCYANATES?

Isocyanates are a group of chemicals that are volatile at room temperature and which historically have had widespread industrial applications. The most common isocyanates in use are:

- toluene diisocyanate (TDI),
- hexamethylene diisocyanate (HDI),
- biuret-modified HDI (HDI-BT), and
- methane diphenyl diisocyanate (MDI).

### USES

Isocyanates are most commonly used in spray-paints and polyurethane coatings.

### SOURCES

Isocyanates may be released due to the application of polyurethane coatings or use of spray paints.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to isocyanates might include:

- Inhalation of air near a source where isocyanates are being manufactured, used or disposed of.
- Dermal contact with isocyanates.

### ENVIRONMENTAL FATE AND BEHAVIOUR

- In the atmosphere, hexamethylene diisocyanate is degraded upon reaction with photochemically produced hydroxyl radicals. The half-life in the atmosphere is 2 days. Atmospheric degradation may also occur through contact with water vapor, clouds, fog or rain.
- Hexamethylene diisocyanate reacts readily with water to form amines and polyureas.



## TOXICITY

- Acute exposure to isocyanates via inhalation can produce eye irritation, moderate skin sensitization and inflammation of the lungs, respiratory edema, and chemical bronchitis.
- Even at low levels, isocyanates can cause respiratory sensitization capable of producing an early or late asthmatic response and nonspecific airway diseases, including chronic pneumonitis.
- The US Department of Health and Human Services has determined that toluene diisocyanate can reasonably be anticipated to be a human carcinogen. The carcinogenicity of other isocyanates is unknown.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Regulations (for MDI)

Jurisdiction	Standards ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		0.51			
Texas					
Ontario	2			0.7	

### Ambient Air Quality Regulations (for HDI)

Jurisdiction	Standards ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas (HDI- biuret)		4			0.4
Texas		0.34			0.034
Ontario (HDI-biuret)	9			3	
Ontario	0.1			0.03	

### Ambient Air Quality Regulations (for TDI)

Jurisdiction	Standards ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta					
Texas		0.36			0.036
Ontario				0.5	

Adapted from:

American College of Occupational and Environmental Medicine. *Exposure to Isocyanates and Organic Solvents, and Pulmonary-Function Changes in Workers in a Polyurethane Molding Process*. JEOM Volume 38, Number 12, December 1996.

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# Chemical Fact Sheets

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Lead, Pb

CAS No. 7439-92-1

## WHAT IS LEAD?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. It has no special taste or smell.

## USES

Lead has many different uses, most importantly in the production of batteries. Lead is also in ammunition, metal products (solder and pipes), roofing, and devices to shield x-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

## SOURCES

Lead can be found in all parts of our environment. Most of it comes from human activities like mining, manufacturing, and the burning of fossil fuels.

## ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to Lead might include:

- Breathing workplace air in lead smelting, refining, and manufacturing industries.
- Breathing fumes or ingesting lead from hobbies that use lead (leaded-glass, ceramics).
- Breathing or ingesting contaminated soil, dust, air, or water near waste sites.
- Breathing tobacco smoke.
- Ingesting water that comes from lead pipes or lead soldered fittings.
- Ingesting contaminated food grown on soil containing lead, or food covered with lead-containing dust.
- Ingesting lead-based paint chips.

Ambient air concentrations of lead were not reported in 1997 or 1998 in Alberta.

## ENVIRONMENTAL FATE AND BEHAVIOUR

- Lead itself does not break down, but compounds of lead are changed by sunlight, air, and water.
- When released from industry or burning of fossil fuels or waste, residence time in the atmosphere is approximately 10 days.
- Most of the lead in soil comes from particles settling out of the air.
- Urban soils also contain lead from landfills and leaded paint.
- Lead adsorbs to soil particles.
- It does not move readily from soil to underground water or surface water unless the water is acidic or "soft".

## TOXICITY

- Lead can affect almost every organ and system in one's body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the immune system. The effects are the same whether lead is inhaled or ingested.
- Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children.
- In adults, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can cause abortion and damage the male reproductive system.
- The US Department of Health and Human Services (DHHS) has determined that lead acetate and lead phosphate may reasonably be anticipated to be human carcinogens.

## OBJECTIVES AND GUIDELINES

### Ambient Air Quality Objectives and Guidelines

Jurisdiction	Guidelines ( $\mu\text{g}/\text{m}^3$ )				
	0.5hr	1hr	8hr	24hr	Annual
Alberta		1.5			
Texas					1.5 (Quarterly average)
Ontario	6			2	0.7 (30 day)
Ontario (in dustfall)					0.1 $\text{gm}^{-2}$ (30 day)

Adapted from:  
 Lead ToxFAQs. Agency for Toxic Substances and Disease Registry.  
<http://www.atsdr.cdc.gov/toxfaq.html>.

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# Chemical Fact Sheets

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## Lindane (1,2,3,4,5,6-hexachlorocyclohexane), C<sub>6</sub>H<sub>6</sub>Cl<sub>6</sub> CAS No. 58-89-9

### WHAT IS LINDANE?

Lindane is a white, crystalline solid with a slight musty odor.

### USES

Lindane is used as a seed treatment insecticide (usually mixed with fungicides) for control of a broad spectrum of plant eating insects and soil-inhabiting insects. Lindane has been used to a lesser extent for public-health pests and animal ectoparasites.

### SOURCES

Lindane's production and use as an insecticide results in its single greatest direct release to the environment. There are no natural sources of lindane to the environment.

### ENVIRONMENTAL LEVELS AND EXPOSURE

Exposure to lindane might include:

- Occupational exposure through inhalation of dust particles and dermal contact during or after its application, or at workplaces where Lindane is produced.
- Inhalation of ambient air, ingestion of contaminated food and drinking water, or dermal contact with medicinal products (scabicides, pediculicides, ectoparasiticides) containing this insecticide.
- Infants may be exposed to lindane via ingestion of contaminated breast milk.

Ambient air concentrations of lindane were not reported in 1997 or 1998 in Alberta.

### ENVIRONMENTAL FATE AND BEHAVIOUR

- If released to air, lindane will exist in both the vapor and particulate phases in the ambient atmosphere.
- Vapor-phase lindane will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals.
- Particulate-phase lindane will be removed from the atmosphere by wet and dry deposition.
- If released to soil, lindane is expected to have very low mobility.
- Volatilization from moist soil surfaces may be an important fate process.
- Lindane is expected to be biodegraded in soil under anaerobic conditions.