Sources of Exposure

General Populations

- Exposure to 1,3-DCP may occur by inhalation of contaminated air, ingestion of contaminated water, or by touching contaminated soil. These levels may be higher near hazardous waste sites.
- 1,1-, 1,2-, 2,3-, and 3,3-DCP are not commonly detected in air, surface water, ground water, drinking water, soil, or food.
- People who live near facilities that produce or use 2,3-DCP may be exposed to higher levels of this chemical.

Occupational Populations

- Workers involved in the production or use of 1,3-DCP as a pesticide.
- Workers involved in the manufacture or use of 2,3-DCP to make other chemicals.
- Workers involved in the manufacture of 1,1-, 1,2-, or 3,3-DCP, although only very small amounts of these chemicals are produced.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- 1,3-DCP vapors are readily absorbed through the lungs in humans. Over 70% absorption was estimated in volunteers.
- 1,3-DCP vapor is absorbed through the skin. Dermal absorption may account for 2–5% of absorption from inhalation.
- There are no data about oral absorption on any isomer.
- There are no data on tissue distribution of DCP isomers in humans.
- In humans, 1,3- and 2,3-DCP are conjugated with glutathione and excreted in urine as N-acetyl cysteine conjugates.
- Depletion of glutathione may result in formation of toxic metabolites.
- There are no *in vivo* data on the metabolism or elimination of 1,1-, 1,2, or 3,3-DCP in humans or animals.
- DCPs do not accumulate in the body.

Normal Human Levels

- No data were located.

Biomarkers/Environmental Levels

Biomarkers

- The N-acetyl cysteine conjugate of 1,3-DCP in urine correlated well with exposure levels in workers.
- For single exposures, urinary testing must be conducted within 2 days of exposure because the metabolite is eliminated quickly.

Environmental Levels

1,1-, 1,2-, 2,3-, and 3,3-DCP are not commonly found at measurable concentrations in air, water, or soil samples.

Air

- 1,3-DCP was detected in <5% of urban air samples. The mean concentration in urban and rural air samples was 0.088–0.33 ppb.

Sediment and Soil

- 1,3-DCP is not commonly found at measurable quantities in soil or sediment samples.

Water

- 1,3-DCP levels in 1999-2006 U.S. monitoring data ranged between 0.002—25 ppb (mean= 0.5 ppb).

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Dichloropropenes. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Dichloropropenes $C_3H_4Cl_2$

CAS# 26952-23-8

September 2011

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

Dichloropropenes are Liquids

- DCPs are synthetic chemicals.
- There are five DCP isomers based on the position of the chlorine atoms in the three-carbon chain: 1,1-DCP, 1,2-DCP, 1,3-DCP, 2,3-DCP, and 3,3-DCP.
- 1,3-DCP is a colorless liquid with a sweet smell. It dissolves in water and evaporates easily.
- 1,2- and 2,3-DCP dissolve in water and all isomers dissolve in organic solvents.
- 1,3-DCP is used mainly in farming as soil fumigant for parasitic nematodes.
- 2,3-DCP is used as a chemical intermediate.
- No uses were found for 1,1-, 1,2-, or 3,3-DCP.

Routes of Exposure

- Inhalation – Predominant route of exposure to 1,3-DCP for the general population. Also, important route of exposure for workers who manufacture 1,3-DCP or 2,3-DCP, or use 1,3-DCP as a soil fumigant for farming.
- Oral – Potential route of exposure at or near waste sites via ingestion of contaminated media.
- Dermal – Skin contact may occur during manufacture or use of these substances or by touching contaminated media near waste sites.

Dichloropropenes in the Environment

- 1,3-DCP in soil and water may undergo hydrolysis and be broken down by microorganisms.
- 1,3-DCP that volatizes to the atmosphere is degraded by photooxidation or by reaction with ozone.
- The half-life of 1,3-DCP in air ranges between 7 and 50 hours.
- Some 1,3-DCP in air may be washed down onto the ground, lakes, or streams by rain.
- Some 1,3-DCP in soil may travel through the soil and reach groundwater.
- Other DCP isomers are expected to behave similarly to 1,3-DCP in the environment, but specific data are not available.

Relevance to Public Health (Health Effects)

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

Minimal Risk Levels (MRLs)

Inhalation

- No acute-duration inhalation MRL was derived for 1,3-DCP.
- An MRL of 0.008 ppm has been derived for intermediate-duration inhalation exposure (15–364 days) to 1,3-DCP.
- An MRL of 0.007 ppm has been derived for chronic-duration inhalation exposure (≥1 year) to 1,3-DCP.
- An MRL of 0.002 ppm has been derived for acute-duration inhalation exposure (≤14 days) to 2,3-DCP.
- No intermediate- or chronic-duration inhalation MRLs were derived for 2,3-DCP.
- No inhalation MRLs were derived for 1,1-, 1,2-, or 3,3-DCP for any exposure duration.

Oral

- No acute-duration oral MRL was derived for 1,3-DCP.
- An MRL of 0.04 mg/kg/day has been derived for intermediate-duration oral exposure (≤15-364 days) to 1,3-DCP.
- An MRL of 0.03 mg/kg/day has been derived for chronic-duration oral exposure (≥1 year) to 1,3-DCP.
- No oral MRLs were derived for 1,1-, 1,2-, 2,3-, or 3,3-DCP for any exposure.

Health Effects

- High concentrations of 1,3-DCP in the air cause respiratory effects including mucous membrane irritation, chest pain, and cough.
- Ingestion of high concentrations of 1,3-DCP causes severe stomach damage.
- Skin contact with pesticides containing 1,3-DCP has produced contact dermatitis and blisters in workers, and an allergic reaction on the skin.
- Dogs that ingested 1,3-DCP developed microcytic anemia.
- EPA has classified 1,3-DCPas a probable human carcinogen based on inadequate data in humans and sufficient evidence in animals. Other isomers have not been classified. DHHS has determined that 1,3-DCP may reasonably be anticipated to be a human carcinogen.

Children's Health

- It is not known whether children are more susceptible to DCPs poisoning than adults.
- Children exposed to DCPs would probably experience the same effects as adults.