

Sources of Exposure

Toxicokinetics and Biomonitoring

Biomarkers/Environmental Levels

General Populations

- Exposure can occur by inhalation of ambient air or ingestion of contaminated drinking water.
- Food wrapped in film containing 1,1-dichloroethene may also be a source of exposure.
- Exposure potential is expected to be higher near hazardous waste sites containing 1,1-dichloroethene or facilities producing or using 1,1-dichloroethene.

Occupational Populations

- Workers involved in the production or use of 1,1-dichloroethene may be exposed by breathing it in workplace air or getting it on the skin.

Toxicokinetics

- Information on the toxicokinetics of 1,1-dichloroethene comes from studies in laboratory animals.
- 1,1-Dichloroethene is rapidly absorbed following inhalation or oral exposure and can probably be absorbed from the skin.
- Absorbed 1,1-dichloroethene is widely distributed in the body; particular targets include the liver and kidneys.
- 1,1-Dichloroethene is rapidly metabolized in the body.
- 1,1-Dichloroethene and its metabolites are rapidly excreted, primarily in the urine and exhaled air.

NHANES Biomonitoring

- In the National Health and Nutrition Examination Survey (NHANES), 1,1-dichloroethene was not detected in whole blood samples taken between the years 2003 and 2008 (the detection limit was 0.009 ppb).

Biomarkers

- 1,1-Dichloroethene can be measured in blood, urine, or expired air. Studies in animals also demonstrate that its metabolites can be measured in blood, urine, and expired air.
- There are no biomarkers of effects that would be specific to 1,1-dichloroethene exposure.

Environmental Levels

Air

- Outdoor air: ambient air levels are typically very low; levels ranging from not detected to 0.059 ppb have been reported.
- Indoor air: usually not detected

Soil

- Subsurface soil and sediment levels ranged from 0.096 to 430 mg/kg.

Water

- Surface water: usually not detected
- Groundwater (range): not detectable to 16 µg/L

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2022. Toxicological Profile for 1,1-Dichloroethene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for 1,1-Dichloroethene C₂H₂Cl₂

(CAS# 75-35-4)
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U.S. Department of Health and
Human Services
Public Health Service
Agency for Toxic Substances
and Disease Registry
www.atsdr.cdc.gov



ATSDR
AGENCY FOR TOXIC SUBSTANCES
AND DISEASE REGISTRY

Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

1,1-Dichloroethene is a Manmade Chemical

- 1,1-Dichloroethene is a colorless liquid that has a mild and sweet smell, evaporates quickly, is flammable, and burns quickly.
- 1,1-Dichloroethene is used to make certain plastics, such as flexible films like food wrap, and in other packaging materials.

- Inhalation** – Likely route of exposure for the general population and workers involved in 1,1-dichloroethene production or use.
- Oral** – Likely route of exposure for the general population from consuming food or water that may contain small amounts of 1,1-dichloroethene.
- Dermal** – Likely route of exposure for workers involved in 1,1-dichloroethene production or use.

1,1-Dichloroethene in the Environment

- 1,1-Dichloroethene breaks down quickly in air.
- If 1,1-dichloroethene reaches soil, it either evaporates to the air quickly or may travel to groundwater.
- Slow microbial degradation (biodegradation) may break down 1,1-dichloroethene in soil, water, and sediment.

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 1,1-dichloroethene.
- An intermediate-duration (15–364 days) inhalation MRL of 0.001 ppm was derived for 1,1-dichloroethene.
- The intermediate-duration inhalation MRL of 0.001 ppm was adopted for chronic duration (>365 days).

Oral

- No acute- or intermediate-duration oral MRLs were derived for 1,1-dichloroethene.
- A chronic-duration (≥ 365 days) oral MRL of 0.05 mg/kg/day was derived for 1,1-dichloroethene.

Health Effects

- Workers exposed to 1,1-dichloroethene have experienced signs of impaired liver function, but other chemicals were present as well.
- Inhalation or ingestion of relatively large doses of 1,1-dichloroethene by experimental animals resulted in damaged livers, kidneys, and lungs.

Health Effects

- Nasal lesions were reported in experimental animals following intermediate or chronic inhalation exposure.
- Higher incidences of birth defects were seen in the offspring of some experimental animals following inhalation exposure to 1,1-dichloroethene.
- Direct contact can result in skin or eye irritation.
- Studies of experimental animals exposed to 1,1-dichloroethene by inhalation showed greater numbers of tumors in blood, nose, kidneys, lungs, liver, and/or mammary gland.
- The U.S. Environmental Protection Agency (EPA) concluded the animal data provide suggestive evidence that inhaled 1,1-dichloroethene may cause cancer. However, EPA noted that the evidence in animals is not sufficient to assess the potential for 1,1-dichloroethene to cause cancer in humans. EPA also determined that the data are inadequate for the oral route. The International Agency for Research on Cancer (IARC) has classified 1,1-dichloroethene as possibly carcinogenic to humans.

Children's Health

- Children exposed to 1,1-dichloroethene would be expected to experience effects similar to those expected in adults.