The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

General Populations

- Contaminated air and water are the most important sources of exposure to trichloroethylene.
- Indoor air may contain trichloroethylene that has migrated from contaminated soil indoors through cracks in foundations, etc.
- Trichloroethylene readily enters the air from water, including contaminated bath and shower water.
- Living in proximity to sites where trichloroethylene is produced or waste sites containing the chemical.
- Using trichloroethylene-containing products such as stains and varnishes, adhesives, typewriter correction fluids, paint removers, and cleaners.

Occupational Populations

- Workers involved in the manufacture of trichloroethylene.
- Workers using degreasers that contain trichloroethylene.
- Workers in the dry cleaning industry.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- Trichloroethylene is readily absorbed from the lung, gastrointestinal tract, and skin.
- Trichloroethylene is widely distributed throughout the body via the blood, regardless of the route of exposure; relatively high concentrations are found in fat, liver, kidney and lung.
- Metabolism of absorbed trichloroethylene occurs mainly in the liver and results in a variety of breakdown products, some of which may be toxic.
- Some trichloroethylene is excreted unchanged in the exhaled air, particularly following inhalation or dermal exposure. Trichloroethylene metabolites (primarily trichloroethanol, trichloroethanol glucuronide, and trichloroacetic acid in humans) are mainly excreted in the urine.

Normal Human Levels

- Trichloroethylene levels in blood of the general population are generally below the detection limit of 0.012 parts per billion (ppb).

Biomarkers/Environmental Levels

Biomarkers

- A reliable biomarker is trichloroethylene in exhaled air, blood, or urine. However, trichloroethylene is rapidly metabolized to other substances which are not specific to trichloroethylene exposure.

Environmental Levels

Air

- Average trichloroethylene concentrations across the United States are generally between 0.01 and 0.03 ppb.

Water

- Trichloroethylene concentrations in drinking water in the United States are generally less than 30 ppb.

Food

- Trichloroethylene levels in food are generally in the low ppb range, but were as high as 140 ppb in some samples.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2014. Toxicological Profile for Trichloroethylene (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

C_2HCl_3

ToxGuide™ for Trichloroethylene

C_2HCl_3

CAS# 79-01-6

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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

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

Trichloroethylene is a Liquid

- Trichloroethylene is a clear colorless liquid with an ethereal, chloroform-like sweet odor.
- Trichloroethylene has been used as an intermediate in the production of the refrigerant HFC-134a, pharmaceuticals, polychlorinated aliphatics, flame retardant chemicals, and insecticides.
- Trichloroethylene is an excellent extraction solvent for greases, oils, fats, waxes, and tars.
- Trichloroethylene has been used by the textile industry to scour cotton, wool, and other fabrics, and as a solvent in waterless drying and finishing operations.
- Trichloroethylene has been used as a solvent in adhesives, lubricants, paints, varnishes, paint strippers, pesticides, and cold metal cleaners.

Routes of Exposure

- Inhalation – Significant potential route of exposure for workers in degreasing operations where trichloroethylene is present; exposure route of concern for general population bathing or showering with trichloroethylene-contaminated tap water.
- Oral – Predominant route of exposure for general population through ingestion of contaminated drinking water.
- Dermal – Potential route of exposure particularly among workers who handle trichloroethylene-containing substances.

Trichloroethylene in the Environment

- Trichloroethylene does not travel long distances by air. Levels in air depend on location; they are usually higher in industrial and populated areas.
- Trichloroethylene readily partitions from soil and water to air.
- Trichloroethylene can be broken down in air by photochemical reactions.
- In water, trichloroethylene volatilizes to air more readily than it undergoes photooxidation or hydrolysis.
- Trichloroethylene on soil surfaces tends to volatilize into the air. When it leaches into soil, it is not readily degraded.
- Trichloroethylene has a low to moderate tendency to bioaccumulate.

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 (≤14 days) inhalation MRL was derived for trichloroethylene.
- An intermediate-duration (15-364 days) inhalation MRL of 0.0004 ppm was adopted from the chronic-duration inhalation MRL for trichloroethylene.
- The EPA RfC of 0.0004 ppm for trichloroethylene was adopted as the chronic-duration (≥365 days) inhalation MRL.

Oral

- No acute-duration (≤14 days) oral MRL was derived for trichloroethylene.
- An intermediate-duration (15-364 days) oral MRL of 0.0005 mg/kg/day was adopted from the chronic-duration oral MRL for trichloroethylene.
- The EPA RfD of 0.0005 mg/kg/day for trichloroethylene was adopted as the chronic-duration (≥365 days) oral MRL.

Health Effects

- Main targets of trichloroethylene toxicity include the central nervous system, kidney, liver, immune system, male reproductive system, and developing fetus.
- Available human data provide strong support for trichloroethylene-induced kidney cancer and lesser support for liver cancer and malignant lymphoma in humans.
- The National Toxicology Program (NTP) has determined that trichloroethylene is a "known human carcinogen".
- The EPA and the International Agency for Research on Cancer (IARC) have determined that trichloroethylene is "carcinogenic to humans."

Children's Health

- Children exposed to trichloroethylene experienced similar effects to those seen in poisoned adults.
- Trichloroethylene has been detected in human breast milk; therefore, it can be transferred to babies by nursing.
- Exposure of pregnant animals resulted in developmental abnormalities in the offspring. This often occurred with doses that were also toxic to the mothers.