

Occupational Uses

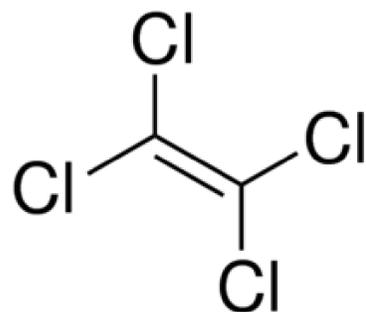


Figure 1. Chemical structure of perchloroethylene
Source: www.sigmaldrich.com

- Perchloroethylene is used as a commercial solvent in dry cleaning and textile processing.
- Perchloroethylene is also used in industrial metalworking as a metal degreaser that readily breaks down grease, oil, and wax residue.

Occupational Exposure

- Workers are primarily exposed by inhaling airborne vapors.
- Workers can be exposed through skin contact with perchloroethylene in liquid form.

Toxicological Data

- Inhalation of perchloroethylene vapors at high concentrations may lead to neurological symptoms (e.g. impaired memory, confusion, dizziness, headache, slurred speech, drowsiness, reduced motor coordination, and loss of consciousness), coma, or death; as well as throat, nose, and eye irritation.
- Direct contact with skin and other areas of the body can cause irritation.
- Long term exposure to perchloroethylene has been known to contribute to some forms of cancer.

Epidemiological Studies

- Studies of workers exposed to perchloroethylene have linked exposure to certain type of cancer, including cancer of the esophagus, kidney, cervix, and bladder, as well as being linked to some types of lymphoma.
- A study of a community in Massachusetts that was affected by high levels of perchloroethylene in their drinking water showed a link to increased lung and bladder cancer as well as leukemia.

Sampling Methods

- OSHA Method 1001: Samples to determine airborne concentrations of perchloroethylene can be gathered using either a personal sampling pump with charcoal adsorbent tubes or by using diffusive samplers.
- Individual worker exposure to perchloroethylene can be assessed by measuring levels in worker's breath.



Figure 2. Activated charcoal tubes and diffusive samplers
Source: www.skinc.com

Biological Monitoring

- Breakdown products of perchloroethylene can be measured in the blood and urine.



Figure 3. Dry cleaning facilities are a major producer of airborne perchloroethylene.
Source: reyscleaners.wordpress.com

Analytical Methods

- The presence and concentration of perchloroethylene in a workspace can be determined analytically by performing gas chromatography (with a flame ionization detector) on the samples collected from either the adsorbent tube or passive sampler methods after proper pretreatment of the samples.

Occupational Exposure Limits (OELs)

- OSHA Permissible Exposure Limit (PEL)
 - 8-hr TWA - 100 parts per million (ppm)
 - Ceiling - 200 ppm (5 minutes)
 - Peak - 300 ppm
- ACGIH Threshold Limit Value (TLV)
 - 8-hr TWA – 25 ppm
 - STEL - 100 ppm
 - Peak - 300 ppm
- NIOSH Recommended Exposure Limit (REL)
 - Not established (lowest feasible concentration)

Control Measures

- Engineering controls - isolating perchloroethylene producing practices/facilities from other work/community areas, switching to newer machines that can better reduce perchloroethylene emission, and improving ventilation.
- Administrative changes - maintaining a proper maintenance schedule, and reducing exposure time through worker rotation and good work practices.
- Personal protective equipment (PPE) - gloves, goggles, and respirators suitable for use with organic chemicals

References

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