

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

General Populations

- The levels of exposure to chlorobenzene in the environment are very low.
- Because chlorobenzene is used as a solvent and as an intermediate in the production of other substances, a small amount may be lost to the environment in water and air discharges.

Occupational Populations

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

Toxicokinetics

- Chlorobenzene is readily absorbed following inhalation or oral exposure and can be absorbed from the skin.
- Absorbed chlorobenzene is widely distributed throughout the body, but may accumulate in fat tissue.
- Chlorobenzene is metabolized in the body to a variety of chlorinated compounds.
- Chlorobenzene and its metabolites are mostly excreted in the urine.

Normal Human Levels

- In the National Health and Nutrition Examination Survey (NHANES), chlorobenzene was not detected in whole blood samples taken between the years 2003 and 2016 (the detection limit was 0.011 ppb).

Biomarkers

- Levels of chlorobenzene and its metabolites have been measured in blood, urine, and exhaled air.
- There are no biomarkers of effect that would be specific to chlorobenzene exposure.

Environmental Levels

Air

- Outdoor air (range): 0.022–0.66 ppb when detected.
- Indoor air: No data.

Sediment and Soil

- Estimated at <5 ppb, but not usually detected.

Water

- Surface water: Generally not detected (detection limit 0.5 ppb).
- Ground water: Generally not detected (detection limit 1 ppb).
- Drinking water: Generally not detected (detection limit 1 ppb).

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2020. Toxicological Profile for Chlorobenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Chlorobenzene C₆H₅Cl

(CAS# 108-90-7)

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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



Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

Chlorobenzene is a Man-Made Chemical

- Chlorobenzene is a colorless, flammable liquid with an aromatic, almond-like odor.
- Chlorobenzene is used as a solvent and as an intermediate in the production of other substances.

- Inhalation** – Most likely route of exposure for workers involved in chlorobenzene production or use. Possible route of exposure by the general population.
- Oral** – Route of exposure by the general population from consuming food or water that may contain small amounts of chlorobenzene.
- Dermal** – Possible route of exposure by workers involved in chlorobenzene production or use.

Chlorobenzene in the Environment

- Chlorobenzene in air will break down rapidly.
- Chlorobenzene that reaches soil or surface water will either evaporate to the air quickly or rapidly break down by microbial degradation (biodegradation).
- Chlorobenzene in oxygenated water and sediment may break down rapidly by biodegradation.
- Chlorobenzene is not expected to bioconcentrate in the environment.

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-, intermediate-, or chronic-duration inhalation MRLs were derived for chlorobenzene.

Oral

- No acute-duration oral MRL was derived for chlorobenzene.
- An intermediate-duration (15–364 days) oral MRL of 0.07 mg/kg/day was derived for chlorobenzene.
- No chronic-duration oral MRL was derived for chlorobenzene.

Health Effects

- Workers exposed to chlorobenzene have experienced disturbances of the central nervous system such as numbness, muscle spasms, and drowsiness.
- Neurological effects have also been reported in experimental animals exposed to airborne chlorobenzene. The effects included muscle spasms, ataxia, and narcosis, which were observed at high concentrations of chlorobenzene. Decreased activity and prostration were also observed in animals following administration of high oral doses.

Health Effects

- Inhalation or ingestion of chlorobenzene by experimental animals resulted in damage to the liver (hepatocellular hypertrophy and bile duct hyperplasia), kidney (tubule dilatation, vacuolation, and degeneration), and hematological system (alterations in red blood cell parameters).
- Results from studies of rats and mice indicate that chlorobenzene may damage the immune system by depleting certain cell types involved in immune responses.
- Chlorobenzene may be irritating to the eyes.
- Studies of female rats and male and female mice orally administered chlorobenzene did not find increases in neoplastic lesions. However, in male rats, there were increases in neoplastic liver nodules, which was considered suggestive of carcinogenicity.
- The U.S. Environmental Protection Agency (EPA) assigned chlorobenzene to Class D (not classifiable as to human carcinogenicity) based on lack of human data, inadequate animal data, and mostly negative results from genotoxicity tests.

Children's Health

- Children exposed to chlorobenzene would be expected to experience effects similar to those expected in adults.