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

Sources of Exposure

General Populations

- Mothballs and deodorant blocks in restrooms are important sources of 1,4-DCB for people who use these products.
- Contaminated air in general is the predominant source of exposure to DCBs for the general population.
- Concentrations of DCBs in soil, water, and food are generally low in comparison to concentrations in air.
- People who live near facilities that produce or use DCBs or near waste sites may be exposed to higher levels of these chemicals.

Occupational Populations

- Contaminated air is an important source of exposure for workers during the manufacture of DCBs or during formulation and use of products that contain DCBs.
- Contaminated dust also is a source for dermal exposure of workers involved in the formulation and use of products containing DCBs.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- DCBs are absorbed by the inhalation and oral routes, but quantitative data are not available. Dermal absorption is not significant.
- There are no data on tissue distribution of DCBs or metabolites in humans. In animals, DBCs distribute throughout the body, but preferentially to fat, liver, and kidneys.
- In animals, DCBs undergo microsomal oxidation, hydrolysis, and extensive conjugation.
- Conjugates are excreted mainly in the urine.
- Elimination of DCBs is relatively rapid and almost complete, but very small amounts may remain in fatty tissue for longer periods of time.

Normal Human Levels

- Median of 0.33 ppb (µg/L) for 1,4-DCB in blood in a national survey conducted in 1994.

Biomarkers/Environmental Levels

Biomarkers

- DCBs can be measured in blood, urine, adipose tissue and breast milk.
- Measurement of urinary metabolites (dichlorophenols) can be used to indicate recent exposure to DCBs.
- Dichlorophenols in urine are not specific biomarkers of exposure to DCBs.

Environmental Levels

Air

- Ambient air (ppb): 0.01–0.1, 0.001–0.1, and 0.01–1 for 1,2-DCB, 1,3-DCB, and 1,4-DCB, respectively. 0.01–100 ppb for 1,4-DCB in indoor air.

Sediment and Soil

- Maximum of 86 ppb for 1,2-DCB and 140 ppb for 1,4-DCB in streambed sediment from 20 major river basins in the U.S. in 2001.

Water

- Mean 0.63 ppb for 1,4-DCB in groundwater in a national survey in 1984. 1,2- and 1,3-DCB were not detected above the quantification limit of 0.5 ppb.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Toxicological Profile for Dichlorobenzenes (Update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Dichlorobenzenes

$C_6H_4Cl_2$

CAS# 25321-22-6

July 2006

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

Dichlorobenzenes are solids and liquids

- Dichlorobenzenes (DCB) are synthetic chemicals.
- There are three DCB isomers based on the position of the chlorine atoms in the benzene ring: 1,2-DCB, 1,3-DCB, and 1,4-DCB.
- 1,2-DCB is a pale yellow liquid used to make herbicides.
- 1,3-DCB is a colorless liquid used to make herbicides, insecticides, medicines, and dyes.
- 1,4-DCB is a colorless to white solid that smells like mothballs.
- 1,4-DCB is used to make mothballs and deodorant blocks.
- 1,4-DCB is also used as an insecticide and in the manufacture of resins.
- 1,4-DCB vaporizes easily.
- DCBs are only slightly soluble in water, but are soluble in common organic solvents.
- DCBs can burn, but not easily.

Routes of Exposure

- Inhalation – Predominant route of exposure for the general population. Also, important route of exposure for workers who manufacture, formulate, or use DCBs.
- Oral – Small amounts of DCBs are found in food. Potential route of exposure for children via ingestion of mothballs.
- Dermal – Skin contact may occur during manufacture or use of these substances or by touching contaminated media near waste sites, but absorption appears negligible.

Dichlorobenzenes in the Environment

- 1,4-DCB enters the environment primarily when used in mothballs and deodorant blocks.
- 1,2- and 1,3-DCB enter the environment when used to make herbicides or when people use products that contain them.
- Most DCBs released into the environment are present as a vapor.
- The half-lives of DCBs in air range between 14 and 31 days. They are degraded in air by reacting with other chemicals.
- DCBs from surface waters and soil evaporate into air.
- DCBs are not easily degraded in soil.
- Plants and fish can absorb DCBs.

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

- An MRL of 2 ppm has been derived for acute-duration inhalation exposure (≤14 days) to 1,4-DCB.
- An MRL of 0.2 ppm has been derived for intermediate-duration inhalation exposure (15–364 days) to 1,4-DCB.
- An MRL of 0.01 ppm has been derived for chronic-duration inhalation exposure (≥1 year) to 1,4-DCB.
- No acute-, intermediate-, or chronic-duration inhalation MRLs were derived for 1,2-DCB or 1,3-DCB.

Oral

- An MRL of 0.7 mg/kg/day has been derived for acute-duration oral exposure (≤14 days) to 1,2-DCB.
- An MRL of 0.6 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days) to 1,2-DCB.
- An MRL of 0.3 mg/kg/day has been derived for chronic-duration oral exposure (≥1 year) to 1,2-DCB.
- An MRL of 0.4 mg/kg/day has been derived for acute-duration oral exposure (≤14 days) to 1,3-DCB.
- An MRL of 0.02 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days) to 1,3-DCB.
- No chronic-duration oral MRL was derived for 1,3-DCB.
- No acute-duration oral MRL was derived for 1,4-DCB.
- An MRL of 0.07 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days) to 1,4-DCB.
- An MRL of 0.07 mg/kg/day has been derived for chronic-duration oral exposure (≥1 year) to 1,4-DCB.

Health Effects

- Very high levels of 1,4-DCB in the air can cause headache, numbness, weakness of the limbs, and ataxia.
- High levels of DCBs in air can cause irritation of the eyes and respiratory tract.
- Inhalation or ingestion of high levels of 1,4-DCB can cause liver damage. Liver effects have also been observed in animals orally exposed to 1,2- or 1,3-DCB.
- Animals that ingested 1,2-DCB had damage to the thyroid and pituitary glands.
- Adverse developmental effects were also observed in animals following inhalation or oral exposure to 1,4-DCB.

Children's Health

- Children exposed to DCBs are likely to exhibit the same effects as adults. We do not know if children would be more sensitive to these effects.