

1,4-Dichlorobenzene and Groundwater

1,4-Dichlorobenzene

1,4-Dichlorobenzene (also known as p-dichlorobenzene) is the primary ingredient in mothballs and deodorant cakes placed in toilet bowls, urinals, and animal holding facilities. People may also use it to control lice and mites in and around birdcages. 1,4-Dichlorobenzene is used as an insecticide on fruit and is used to control mold and mildew growth on tobacco seeds, leather, and certain fabrics. It is also approved for controlling wax moths in empty, stored beehives.^{1,2}

1,4-Dichlorobenzene in Minnesota Waters

Some surface waters and groundwaters are monitored to assess environmental conditions. In surface water, 1,4-dichlorobenzene has been detected in three percent of river and stream samples, with a maximum concentration of 0.1 µg/L.³ In groundwater, 1,4-dichlorobenzene has been detected in one percent of samples, with most samples below a concentration of 1 microgram per liter* (µg/L).³

Drinking water quality is monitored separately. 1,4-Dichlorobenzene has been detected in less than one percent of 9,849 drinking water samples collected in the last 10 years. The maximum detection was 4.6 µg/L.⁴ All detections have been below the MDH health-based guidance value of 50 µg/L and the Safe Drinking Water Act limit of 75 µg/L.

*One microgram per liter (µg/L) is the same as one part per billion (ppb).

MDH Guidance Value

Based on available information, MDH developed a guidance value of 50 µg/L for 1,4-dichlorobenzene in drinking water. MDH does not use guidance values to regulate water quality, but they may be useful for situations in which no regulations exist. MDH develops guidance values to protect people who are most vulnerable to the potentially harmful effects of a contaminant. A person drinking water at or below the guidance value would be at little or no risk for harmful health effects.

Potential Health Effects

Young (pre-birth and infant) laboratory animals exposed to high doses of 1,4-dichlorobenzene had some adverse developmental effects, including on neurodevelopment (brain development). Adult laboratory animals that ingested high doses of 1,4-dichlorobenzene had adverse liver and kidney effects.

Although the International Agency for Research on Cancer identified 1,4-dichlorobenzene as “possibly carcinogenic to humans,”⁵ the most recent United States Environmental Protection Agency (US EPA) report on 1,4-dichlorobenzene has classified it as “not likely to be carcinogenic to humans.”² The MDH guidance value of 50 ppb not only protects Minnesotans from the potential health effects listed here, but also for potential cancer effects that were observed at high doses in laboratory animals.

Potential Exposure to 1,4-Dichlorobenzene

You are most likely to be exposed to 1,4-dichlorobenzene by breathing it in. As 1,4-dichlorobenzene is exposed to air, it slowly transitions from a solid to a vapor. This vapor deodorizes the air and kills insects. Relatively small amounts of 1,4-dichlorobenzene can get into our food supply and groundwater through wastewater streams and landfill leachate.¹

Using 1,4-Dichlorobenzene Safely

Exposure to 1,4-dichlorobenzene can be minimized by spending less time in enclosed areas that have products containing this chemical. Keep children away from mothballs and toilet deodorizers to reduce the chance of accidental ingestion. Dispose of household products containing 1,4-dichlorobenzene properly through a household hazardous waste collection site to keep it out of landfills and the environment.

1,4-Dichlorobenzene in the Environment

1,4-Dichlorobenzene is released into the environment through the manufacturing, use, and disposal of household products containing 1,4-dichlorobenzene.⁶ Although it volatilizes into the air quickly, it breaks down very slowly in soil, water, and air. It is moderately mobile in soil and groundwater as it has some ability to bind to soil and sediment.⁶

Potential Environment Impacts of 1,4-Dichlorobenzene

1,4-Dichlorobenzene is not highly toxic to aquatic organisms, and concentrations in surface waters have not been observed at high enough concentrations to produce adverse effects to aquatic life.

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in drinking water sources and develops health-based guidance values for groundwater. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

References

1. Agency for Toxic Substances and Disease Registry. (2006). Toxicological Profile for Dichlorobenzenes. Retrieved from <https://www.atsdr.cdc.gov/ToxProfiles/tp.asp?id=704&tid=126>
2. U.S. Environmental Protection Agency (EPA). (2018). para-Dichlorobenzene: Human Health Risk Assessment in Support of Registration Review. Retrieved from <https://www.regulations.gov/document?D=EPA-HQ-OPP-2016-0117-0013>
3. National Water Quality Monitoring Council. (2016). Water Quality Portal (<https://www.waterqualitydata.us>). Accessed July 2019.
4. Minnesota Drinking Water Information System (MNDWIS). (2019). Accessed by MDH staff July 2019.
5. International Agency for Research on Cancer. (2019). IARC Monographs on the Identification of Carcinogenic Hazards to Humans. Retrieved from: <https://monographs.iarc.fr/agents-classified-by-the-iarc/>
6. Hazardous Substances Data Bank. (2019). Results for "1,4-dichlorobenzene". Retrieved from <https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/f?/temp/~r6Ut0p:1>. Accessed July 2019.

Minnesota Department of Health
Health Risk Assessment Unit
PO Box 64975, St. Paul MN 55164
651-201-4899
health.risk@state.mn.us
www.health.state.mn.us

SEPTEMBER 2019

To obtain this information in a different format, call: 651-201-4899.