Benzene Air Guidance

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Benzene is a highly flammable chemical solvent commonly detected in outdoor air. Benzene is mainly released into the air through industrial/manufacturing processes and vehicle emissions but can also be released from natural sources including forest fires. Benzene is a component of petroleum, and most benzene used for industrial and/or manufacturing processes today comes from refined crude oil. Benzene is an intermediate in the production of various plastics, resins and synthetic fibers and is used in the manufacturing of certain types of rubber, lubricants, glues, furniture wax, drugs, and pesticides. Generally, most people can start to smell benzene in air at a level of about 190,000 micrograms per cubic meter ($\mu g/m^3$).

How can you be exposed to benzene in air?

- Working in an area that uses or produces benzene as part of an industrial or manufacturing process
- Living near gas stations, areas with high motor vehicle emissions, petroleum facilities, oil refineries, or hazardous waste sites
- Tobacco smoke is a major source of benzene particularly in indoor air

Benzene released in the outdoor air breaks down within a few days and does not build up in plants or animals.

Potential health concerns from breathing benzene

In human and animal studies, harmful effects to blood-forming organs like bone marrow or components of the blood (collectively known as hematotoxicity) are the most sensitive endpoint from inhaled benzene exposure.

Both human and animal studies show breathing benzene can cause reduced blood cell counts (white blood cells, red blood cells, or platelets) and disruptions to bone marrow. Exposure to benzene over long periods can increase the risk of certain types of blood cancers.

Benzene is a known human carcinogen. Long-term human occupational studies have shown sufficient evidence of a link between benzene exposure and leukemia, specifically acute myeloid leukemia/acute non-lymphocytic leukemia.

Benzene Health-based Values

Sufficient toxicity data was available for MDH to develop HBVs for acute, short-term, subchronic, and chronic exposures (see table). Hematotoxicity is the critical effect for all exposure durations. The HBVs are levels in air that are likely to pose little or no risk to human health over that time period. They are protective for the general public, including sensitive subpopulations.

Breathing an amount of benzene that is above the HBV does not mean health effects will occur; however, the risk for health effects can increase as the level of exposure and/or time of exposure increases. When HBVs are exceeded, MDH recommends taking steps to reduce or avoid exposures.

Duration	2020 HBV ($\mu g/m^3$)	Health Endpoint
Acute (24 hours or less)	30	hematotoxicity
Short-term (>24 hrs-30 days)	10	hematotoxicity
Subchronic (>30 days-~8 years)	8	hematotoxicity
Chronic (>~8 years-lifetime)	3	hematotoxicity
Cancer (lifetime)	0.8	hematotoxicity

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