**What is benzene?**

Benzene is a colorless liquid with a sweet odor. It evaporates into air very quickly and dissolves slightly in water. Benzene is highly flammable. It is widely used in the United States as a constituent in motor fuels and as a solvent. Benzene is also used to make plastics, dyes, detergents, drugs and pesticides. Tobacco smoke and gasoline contain benzene, and natural sources of benzene include emissions from volcanoes and forest fires.

**Who is exposed to benzene?**

Exposure to benzene can occur through inhalation and ingestion. Sources of benzene exposure in air come from tobacco smoke, gas stations, exhaust from motor vehicles and industrial emissions. Smoking produces 50% of exposure to benzene in the United States. About 20% of the total national exposure to benzene account from auto exhaust and industrial emissions. Exposure to higher levels of benzene in air affects people living in cities or industrial areas more than those living in rural areas. For most people, the level of exposure to benzene through food, beverages, or drinking water is not as high as through air.

**How can benzene affect my health?**

Acute Effects: Short-term inhalation of benzene can cause headaches, dizziness, drowsiness, confusion and unconsciousness in humans. Ingestion of large amounts of benzene may cause vomiting, irritation in stomach, sleepiness, convulsions, rapid heart rate and death. Studies in animals show neurologic, immunologic and hematologic effects from inhalation and oral exposure. Short-term exposure in rats and mice shows low acute toxicity.

Chronic Effects: Long-term inhalation exposure to benzene can affect bone marrow and can cause blood disorders in humans. Benzene causes anemia, excessive bleeding and damage to the immune system. Women who breathe high levels of benzene may have irregular menstrual periods and a decrease in the size of the ovaries. There is no information on the effects of fertility in men.

**How likely is benzene to cause cancer?**

Long-term exposure to high levels of benzene in the air can cause leukemia, particularly acute myelogenous leukemia, often referred to as AML. This is a cancer of the blood forming organs. The Department of Health and Human Services (DHHS) has determined that benzene is a known carcinogen. The International Agency for Research on Cancer (IARC) and the U.S. Environmental Protection Agency (EPA) have determined that benzene is carcinogenic to humans.

**How can benzene affect children?**

Children are affected by benzene exposure in the same way that adults are. It is not known whether children are more susceptible than adults. Benzene can pass through the mother’s blood to a fetus. Benzene has been shown to delay bone formation, and damage bone marrow in animal studies where a pregnant animal was exposed to benzene in the air.

**Is there a medical test to determine whether I have been exposed to benzene?**

There are several medical tests to determine benzene exposure. There are tests for benzene in both the breath and blood. However, these are only useful for recent exposures because benzene is removed from the body quickly.

There are also tests for various benzene metabolites. For example, s-phenylmercapturic acid can be measured in urine to indicate benzene exposure. It also must be done soon after exposure, and does not indicate how much benzene you have been exposed to, and cannot predict health effects.

**How can I reduce the risk of exposure to benzene?**

You can reduce exposure to benzene by limiting your contact with gasoline and cigarette smoke. People who smoke should not smoke in the house, in enclosed environments, or near children.

**Has the federal government made recommendations to protect human health?**

The Occupational Safety and Health Administration (OSHA) permissible exposure limit is 1 part per million (ppm) benzene in workplace air. The Reference Concentration (RfC) for benzene is 30 micrograms per cubic meter ($\mu g/m^3$). The Agency for Toxic Substances and Disease Registry's (ATSDR) Minimal Risk Level (MRL) for acute inhalation is 30 $\mu g/m^3$, chronic inhalation is 10 $\mu g/m^3$ and oral consumption is 0.0005 milligrams per kilogram of body weight per day (mg/kg/day). EPA Maximum Contaminant Level (MCL) is 5 parts per billion (ppb).

**Where can I get more information on benzene?**

- If you have concerns about benzene, contact your healthcare provider.
- Call your local health department. A directory of local health departments is located at https://www.vdh.virginia.gov/local-health-districts/. Contact the Virginia Department of Health at (804) 864-8182 or at toxicology@vdh.virginia.gov.
- Visit the Agency for Toxic Substances and Disease Registry website at https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=14 .

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