What You Need to Know About Benzene

What is Benzene?

Benzene is a clear, colorless-to-light yellow flammable liquid that has a sweet, aromatic odor. Benzene is a volatile organic compound made mostly from petroleum. It evaporates into the air quickly and dissolves slightly in water. Although it can be formed naturally, most benzene exposure results from human activities.

What Are The Uses of Benzene?

Benzene is the 17th most abundantly produced chemical in the United States. It is widely used, mainly used as a starting material in making other chemicals such as styrene, phenol and cyclohexane. Benzene is also used to manufacture:

- Dyes
- Detergents
- Explosives
- Waxes
- Resins
- Oils
- Inks
- Paints
- Rubbers
- Plastics
- Lubricants
- Pesticides
- Pharmaceuticals
- Styrofoam

Benzene can also be found naturally in crude oil and gasoline. As such, Benzene can be found in emissions from burning coal or oil, motor vehicle exhaust, and evaporation from gasoline service stations. Benzene is also a natural part of cigarette smoke.

How Might I Be Exposed To Benzene?

The main way people are exposed is by breathing air containing benzene. Outdoor air contains low levels of benzene from tobacco smoke, gas stations, motor vehicle exhaust, and industrial emissions. Nearly half of the national exposure to benzene occurs through cigarette smoke. Another twenty percent of benzene exposure is attributable to automobile exhaust and industrial emissions. However, vapors from products that contain benzene, such as glues, paints, solvents, furniture wax, art supplies and detergents can also be a source of benzene exposure.

Individuals who are employed in industries that manufacture or use benzene—such as the rubber industry, oil refineries, chemical plants, shoe manufacturers and gasoline related industries-- are at a heightened risk of benzene exposure. Other people potentially exposed to benzene at work include steel workers, lab technicians, printers, firefighters and gas station employees.

Additionally, individuals may be also be exposed by coming into contact with benzene contaminated water or soil. Leakage from underground gasoline storage tanks, landfills, factories and hazardous waste sites can contaminate soil and groundwater. As a result, people living near these sites can be exposed when they drink or cook with benzene contaminated water from private wells that drill into the groundwater, or by breathing in vapors while showering or bathing. Benzene in groundwater can also volatilize, or turn into a gas, migrate up through the soil and into the air in people's homes through tiny cracks in the foundation, exposing the residents to benzene vapor contamination.

The United States Environmental Protection Agency (US EPA) identifies the most serious hazardous waste sites across the nation. Benzene has been found in at least 1,000 of these "Superfund" sites.

What Happens to Benzene in the Environment?

Industrial processes are the main source of benzene in the environment. Benzene levels in the air are affected by emissions from burning coal and oil, tobacco smoke, benzene waste and storage operation leaks, automobile exhaust, and evaporation from gas stations.

In the air, benzene reacts quickly with other chemicals and is broken down within a few days. However, before it is broken down, benzene in the air can attach to rain or snow and be carried back to the ground.

Benzene breaks down much slower in water and soil. Soil and groundwater become contaminated with benzene as a result of leakage from underground gasoline storage tanks, landfills or hazardous waste sites that handle benzene or from industrial discharge or improper disposal of benzene containing products. When benzene comes into contact with soil, it can trickle down into underground water. Once in groundwater, Benzene can also volatilize into a gas and migrate back up through the soil.

How Can Benzene Affect My Health?

Both the United States Environmental Protection Agency (US EPA) and the International Agency for Research on Cancer (IARC), a division of the World Health Organization (WHO), have concluded that benzene is carcinogenic to humans.

Scientific studies have linked benzene exposure to an increased risk of cancer in humans. Specifically, there is evidence linking benzene exposure to the following cancers:

- Acute Myelogenous Leukemia
- Non-Hodgkin's Lymphoma
- Multiple Myeloma
- Acute lymphocytic leukemia
- Chronic lymphocytic leukemia
- Childhood leukemia

The main targets of benzene toxicity are the central nervous system, the hematopoietic system and the immune system. There is evidence linking benzene exposure to the following health problems:

- Aplastic Anemia
- Excessive Bleeding
- Ventricular Fibrillation
- Thrombocytopenia
- Pancytopenia (a reduction in red and white blood cells and platelets)

- Myeloblastic Dysplasia
- Bone Marrow Dysplasia
- Miscarriage

Symptoms of Benzene exposure include:

- Skin Irritation
- Eye Irritation
- Headache
- Lightheadedness
- Dizziness
- Sleepiness
- Confusion
- Nausea
- Vomiting
- Diarrhea
- Impaired Gait
- Blurred Vision
- Tremors
- Convulsions
- Rapid Heart Rate
- Respiratory Depression
- Accumulation of Fluid in Lungs
- Hemorrhagic Inflammation of the Lungs
- Loss of Consciousness
- Coma
- Death

Benzene exposure may also have detrimental effects on the reproductive system. Studies have shown disturbances in menstrual cycles and even impairment of fertility in women. Benzene is also known to cross the human placenta and is present in umbilical cord blood. However, because participants in these studies were exposed to a mixture of chemicals, it is difficult to definitively assess the effect benzene has on reproduction. Exposure to benzene with ethanol (e.g., alcoholic beverages) can increase benzene toxicity in humans.

Is there a Medical Test That Shows Whether I Have Been Exposed to Benzene?

Personal exposure to benzene can be measured in an individual's breath or blood. Breakdown produces of benzene can also be measured in urine. However, tests to measure benzene must be done shortly after exposure as benzene rapidly disappears in blood. Generally, these tests are not very helpful in detecting low levels of benzene in the body.

How Can I Reduce my Family's Risk of Exposure to Benzene?

1. Benzene exposure can be reduced by limiting your family's exposure to gasoline and cigarette smoke. Families are encouraged to not smoke inside their home, or any other enclosed environment, or near children. Benzene exposure can occur from actively smoking as well as passive, second-hand smoke.
2. Get your private well and the air inside your home tested.
3. Avoid drinking water from contaminated sources. If your water source is contaminated, drink bottled water until a solution can be reached. You should also limit showers and baths or use bottled water.
4. Prevent children from playing in dirt if you live near a benzene contaminated site.
5. Seal sump pumps and cracks in your foundation, and increase the ventilation in your home.
6. Demand the polluter pay for you to have access to a clean water source.
7. If necessary, demand the polluter install a vapor mitigation system to get rid of toxic vapors. Demand the polluter clean up the contaminated site.
8. Demand the polluter clean up the contaminated site, groundwater and soil.
9. Contact an experienced environmental lawyer to help you with each of these steps.

What Should I Do if I'm Concerned My Health May be Affected?

If you believe you have been exposed to benzene, speak to a doctor familiar with chemical exposure as soon as possible. Let them know if you have been exposed to benzene and bring with you any benzene test results.

Benzene Can Also be Labeled As:

Annulene; Benzol; Benzole; Coal naphtha; Cyclohexatriene; Phenyl hydride; Pyrobenzol; Pyrobenzole; Benzolene; Bicarburet of hydrogen; Carbon oil; Mineral

naphtha; Motor benzol; Benzeen; Benzen; Benzin; Benzine; Benzolo; Fenzen; NCI-C55276; Phene; Rcra waste number U019; UN 1114; NSC 67315; 1,3,5-Cyclohexatriene.

Links:

https://www.atsdr.cdc.gov/MHMI/mmg3.pdf

https://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=14

https://www.atsdr.cdc.gov/ToxProfiles/tp3-c1-b.pdf

https://www.atsdr.cdc.gov/toxguides/toxguide-3.pdf

https://www.epa.gov/sites/production/files/2016-09/documents/benzene.pdf

http://webbook.nist.gov/cgi/cbook.cgi?Units=SI&Name=BENZENE

https://www.cancer.org/cancer/cancer-causes/benzene.html