

Benzene

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Benzene: Properties, Uses and Hazards Your Full Introduction Benzene is an organic compound characterized by its sweet, sickly smell. It has a chemical formula of C_6H_6 and its structure is a hexagon from the six carbon atoms with double bonds on every other carbon atom. Most aromatic compounds are synthesized with benzene as one of its starting materials. This paper discusses some of the physical and chemical properties of benzene, its uses and hazards.

The Chemical and Physical Properties of Benzene

Benzene is a nonpolar molecule with a molecular weight of 78.11 g/mole. It is also known as benzol and mineral naphtha, and has a chemical reference number (CAS) of 71-43-2 (dhs. wisconsin. gov, 2013). At room temperature, it is liquid and is a bit viscous. Its density is 0.879 g/mL and turns to vapor at $80.1^{\circ}C$. It is a flammable aromatic hydrocarbon and is not completely miscible with water, but can dissolve in other solvents like acetone, chloroform or carbon tetrachloride (EPA, 1988). Because of its high flammability and volatility, the chemical must be kept away from sparks, open flame, heat or other hot surfaces that may cause fire or explosion (cpchem. com, 2014).

Uses of Benzene

Benzene is a common part of industrial manufacturing of plastics, man-made fibers, rubber lubricants, colorants and pesticides. It is also a component in gasoline and other petroleum products. In nature, volcanoes and forest fires emit benzene into the atmosphere. Residential uses of benzene are found in adhesives, paint removers and gasoline. Petroleum products are the major contributors of benzene in the environment (dhs. wisconsin. gov, 2013).

Other aromatic chemicals such as phenol and toluene, are also synthesized from benzene either by replacing the hydrogen atoms in the molecule or by cleavage of the bonds in the benzene molecule. Most chemicals from benzene are products of substitution reactions (epa. gov, 1988).

Hazards and Precautions

Humans are exposed to benzene in different ways, namely through inhalation, ingestion or by skin contact. The most common route of benzene exposure is by inhalation, especially when humans are exposed to petroleum products or benzene-containing paints and resins. When benzene is released in its vapor form from manufacturing industries, the people living near the area are exposed and inhale it. The symptoms that may be experienced when exposed to benzene for short periods are headaches or nausea.

However, for longer periods high risk of having cancer and anemia are some of the health effects. Some studies in animals have shown that prolonged exposure to benzene vapors caused infertility and damaged reproductive organs. Females working in industries with high benzene levels in the workplace have been reported to have irregular menstruation cycles (dhs. wisconsin. gov, 2013).

In residential areas the federal government has set the limit for drinking water to contain only up to 5 parts per billion [ppb] and water used for washing or bathing must not contain more than 100 ppb. In terms of indoor air quality, benzene level must not exceed 0.95 parts per billion per volume [ppbv]. Although at this level, benzene smell cannot be recognized, it is important to know that once it is recognizable, it means that the level is already unsafe (dhs. wisconsin. gov, 2013).

Workers in petroleum, paint and rubber industries are highly exposed to the chemical and as part of ensuring their safety, the National Institute for Occupational Safety and Health [NIOSH], have established standards and limits for exposure. It is important that workers exposed to benzene wear appropriate personal protective equipment [PPE] and that the air in the workplace complies with the safety level mandated by the government (cdc.gov, 1994.).

Conclusion

Benzene is a chemical needed in the different industries to manufacture some of the materials that we need in our day-to-day lives. However, it is necessary to know the hazards that come with this chemical. Different government agencies have established the limits in order to keep everybody safe and prevent its harmful effects. It is then important that we know where benzene is used, how it can affect us, how we are exposed and the simple safety measures that ordinary people can do to prevent its harmful effects.

References

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