Benzene
Product Stewardship Summary
(CAS number 71-43-2)

Chemical Formula for Benzene
C₆H₆

What is Benzene?
Benzene is a cyclical, six carbon, six hydrogen molecule. It is a clear, colourless, volatile liquid with a characteristic ‘aromatic’ smell. Benzene is extracted from two primary sources: from pyrolysis gasoline (pygas) which is a co-product of ethylene manufacture, or from reformate, a stream resulting from the catalytic reforming process used to produce high octane gasoline. Benzene can also be derived from toluene via two on-purpose routes: hydrodealkylation and disproportionation.

How is Benzene Used?
Benzene is an important basic chemical, produced in large quantities and traded internationally. It is widely used in the industrial sector, where it is combined and processed with other basic chemicals (such as ethylene or propylene) to produce countless consumer goods.

The largest derivative outlet for benzene is ethylbenzene, an intermediate used in the production of styrene, which is further converted into materials such as polystyrene. It is also widely used to produce cumene, which in turn leads to phenol, a component in phenolic resins and adhesives; cyclohexane, a precursor of caprolactam and adipic acid, both used in nylon; and aniline, a material needed to produce methylene diphenyl diisocyanate (MDI) which is used in urethanes and other speciality applications.

The result is a variety of products that we all use every day: clothing, packaging, paints, adhesives, unbreakable windows, plywood, computer casings, compact discs, dyes, agrochemicals, pharmaceuticals and many more.

Health, Safety and Environmental Considerations
In liquid form, benzene is irritating to the skin and eyes. If vapours are inhaled, irritation to the respiratory tract may be experienced. Benzene exposure is not associated with skin or respiratory sensitisation in humans. Single exposure to very high concentrations can cause disorientation, euphoria and unconsciousness. Prolonged moderate exposure to benzene has been associated with toxic effects on the blood and blood-forming organs, such as anemia, acute myeloid leukemia or acute non-lymphocytic leukaemia and myelodysplastic syndrome. Benzene is classified as a mutagen.

In the work environment, the occupational exposure limit for benzene globally ranges from 0.2 to 1 ppm. The available information shows that for the general public, exposures to benzene in ambient...
air are considerably lower with no evidence for concern regarding health effects at these low (ppb) levels.

Benzene is extremely flammable and there is a risk of vapour ignition at normal handling temperatures. The vapour is heavier than air and will spread along the ground if released, so care needs to be taken to ensure that the vapour is not ignited by a distant source. It will float on water and can be ignited on surface water. Electrostatic charges may be generated during handling.

If spilled in water, benzene is toxic to fish, but it is very volatile and evaporates rapidly. It is not soluble in water and readily biodegradable.

**Storing and Transporting Benzene**

Benzene should be stored in mild steel or stainless-steel tanks. Benzene is mainly transported by pipeline and vessel. Benzene is flammable and can accumulate static electricity during transfer; therefore, precautionary measures to prevent static discharge must be taken.

**Risk Characterization Summary**

Risks associated with exposure to this product have been evaluated for the following “chain-of-commerce” activities: manufacture, storage, product transfer, transportation, and customers/markets. Due to health, safety and environmental considerations, it is only manufactured, stored and transported to customers in closed systems. Likewise, customers are limited to those who only use the product in closed systems as an intermediate for the manufacture of other chemicals. Proper equipment design and handling procedures maintain low risk from exposure to the product where the product is used as a chemical intermediate.

This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the chemical’s applicable Safety Data Sheet, which should be consulted before use of the chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.

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