BENZENE Product Stewardship Summary

(CAS number: 71-43-2)
Chemical Formula: 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 end 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. Single exposure to very high concentrations can cause disorientation, euphoria and unconsciousness. Prolonged moderate exposure to benzene can cause toxic effects on the blood and blood-forming organs, such as anemia, acute myelogenous leukemia, or myelodysplastic syndrome.

In the work environment, the occupational exposure limit for benzene globally ranges from 0.5 - 10 ppm, with 1 ppm being used across most of the world. The available information shows that
Benzene Product Stewardship Summary
December, 2012

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.

In Europe benzene is registered according the “REACH Regulation” (EC) No 1907/2006 as transported intermediate under strictly controlled conditions. According Annex XVII of regulation (EC) No 1907/2006 sale to general public is prohibited.

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 rapidly biodegrades.

Storing and transporting Benzene

Benzene should be stored in mild steel or stainless steel.

Benzene is transported mainly by sea or inland waterway and is subject to a number of international guidelines for safe handling of cargoes. These include the International Maritime Dangerous Goods (IMDG) from the International Maritime Organisation (IMO), the International Safety Guidelines for Oil Tankers and Terminals (ISGOTT) and the ADNR (Accord europeen relatif au transport international des marchandises Dangereuses par voie de Navigation interieure au Rhine) regulations. In the US, marine transport must be in compliance with the US Coast Guard Benzene Standard. Precautionary measures must be taken to prevent static discharges during loading and unloading and all operators must wear personal protective equipment.

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. Control measures including equipment design and handling procedures have been established to minimize the exposure potential to workers, community and the environment. As such, the risks associated with the product are judged to be low.
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 Material 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.

Disclaimer

The information contained in this publication is, to the best of our knowledge, true and accurate, but any recommendations or suggestions that may be made are without guarantee, since the conditions of use are beyond our control. Furthermore, nothing contained herein shall be construed as a recommendation to use any product in conflict with existing patents covering any material or its use.

Shell Chemicals

The expression “Shell Chemicals” refers to the companies of the Shell Group of companies that are engaged in the chemical businesses. Each of the companies that make up the Shell Group of companies is an independent entity and has its own separate identity.

© Shell Chemicals 2012