Shell Chemicals

PHENOL Product Stewardship Summary

CAS number
108-95-2

Chemical formula
C6H5OH

What is phenol?

Phenol, also known has hydroxybenzene, monohydroxy benzene and carbolic acid, is derived from the basic raw materials of benzene and propylene. These materials are first used to produce cumene, which is then oxidised to become cumene hydroperoxide, before being split into phenol and its co-product, acetone. Phenol is typically a solid at room temperature as it solidifies at 41°C (106 °F).

How is phenol used?

Phenol plays an unseen, but major role, in our everyday lives. Plywood, window glazing, DVDs and CDs, computers and sports equipment are some of the many items that rely on this important raw material. Phenol is a major component of the phenolic adhesives used in wood products such as plywood and oriented strand board. It is also used to produce phenolic resins, which are used in the moulding of heat-resistant components for household appliances, counter-top and flooring laminates, and foundry castings. In addition, it is a valuable intermediate in the manufacture of detergents, agricultural chemicals, medicines, plasticisers, and dyes.

The largest single market for phenol is in the production of Bisphenol A (BPA), which is manufactured from phenol and acetone. BPA is, in turn, used to manufacture polycarbonate (the largest and fastest growing use for BPA) and epoxy resins. Both polycarbonate and epoxy resins are used in many different industries and in countless items which we encounter every day like CDs, circuit boards and fibre glass boats.

When reacted with bromine, BPA forms the fire retardant tetrabromobisphenol A. BPA is also used to manufacture engineering thermoplastics such as polysulfones and polyarylates.

Health, Safety and Environmental considerations

Phenol is toxic and corrosive. It is classified by the US Department of Transportation (DOT), IMDG, and IATA as Class 6.1/poison. Phenol is also classified as combustible in the US with a flash point of 175º F/79.4º C.

Most exposure to phenol is through skin contact; it can be fatal if absorbed through the skin or if swallowed. Phenol vapours will cause severe eye, respiratory and digestive tract burns. Even moderate exposure might be fatal since phenol deadens the feeling in exposed areas.

Although phenol is classified as a mutagen - and such chemicals may have a cancer risk - there is inadequate evidence in experimental animals for the carcinogenicity of phenol. Phenol has been assigned a class 3, classification not possible from currently available data[, by the International Agency for Research on Cancer (IARC). Phenol has been tested and has not been shown to affect reproduction.

The American Conference of Governmental Industrial Hygienists (ACGIH) has assigned an eight-hour occupational exposure limit of 5 parts per million (ppm) for phenol.

Phenol is toxic to aquatic organisms. It is readily biodegradable and has a low potential to bioaccumulate.

Storage and transport

Phenol should be stored in stainless steel or Carbozinc II lined tanks. The transport of phenol is carefully managed and storage containers are normally kept at temperatures above 41° C to maintain the product as a liquid. If transported by rail, only top loaded cars are used. Transport by truck is contracted by Shell or by customer pick up and only if the truck meets an on-site inspection.

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 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 documents.