

ISOPRENE Product Stewardship Summary

CAS number

78-79-5

Chemical formula

C₅H₈

What is isoprene?

Isoprene (C₅H₈) is a colourless liquid with an aromatic odour. It is insoluble in water, soluble in alcohol and because of its low vapour pressure and double bonds is very reactive.

Commercially viable quantities of isoprene are extracted under tightly controlled conditions from a by-product stream of ethylene manufacture and are therefore essentially derived from crude oil via a number of extraction steps.

How is isoprene used?

The polymerisation of isoprene using catalysts yields a synthetic rubber, polyisoprene, which closely resembles natural rubber. Polyisoprene is used in a wide variety of rubber applications including medical equipment, baby bottle teats/nipples, toys, shoe soles, tyres, and elastic films and threads for golf balls or textiles. It is also used in adhesives and in paints and coatings.

Butyl rubber, made from isobutene with a small amount of isoprene, using an aluminum chloride initiator, has outstanding impermeability to gases and is used, for example, in inner tubes. Styrene-isoprene-rubber is a copolymer that is used in pressure sensitive adhesives.

Health, Safety and Environmental considerations

Isoprene is extremely flammable and highly reactive. This means that it can burn explosively and can also spontaneously 'polymerise'.

Prolonged contact with the substance can cause irritant effects to skin and eyes and inhaling it in high concentrations can cause dizziness and headache.

Isoprene is classified as a possible human carcinogen by the International Agency for Research on Cancer (IARC); in Europe it is classified as a category 2 carcinogen and category 3 mutagen. These classifications are based on the results of animal studies as no such effects have been observed in humans.

The American Conference of Governmental Industrial Hygienists currently recommends an exposure level of 50 parts per million.

In the aquatic environment, isoprene will evaporate rapidly, followed by rapid atmospheric oxidation.

Storage and Transport

Shell chemicals companies ship isoprene by barge/ship, rail and road. To prevent peroxide formation, which could lead to uncontrolled polymerisation when the product is transported or stored, another chemical is added to stabilise isoprene, and it is stored under a non-flammable (inert) gas.

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.