GPS' Safety Summary for 1,3-Butadiene

Select a Topic:
Names
Product Overview
Manufacture of Product
Product Description
Product Uses
Exposure Potential
Health Information
Environmental Information
Physical Hazard Information
Regulatory Information
Additional Information

Names
Some common chemical identifiers, names and synonyms include:

- CAS No. 106-99-0
- 1,3-Butadiene
- Buta-1,3-diene
- Butadiene
- Biethylene
- α,γ-Butadiene
- Vinylethylene
- Divinyl
- Divinyl
- Erythrene

Product Overview

- SABIC's 1,3-butadiene is a colourless (liquefied) gas with an aromatic characteristic odor. For further details, see Product Description.
- 1,3-Butadiene is mainly used as a monomer in the manufacture of synthetic rubber and other plastics. Its other use is as an intermediate for the production of other chemicals. For further details, see Product Uses.
- Exposure to 1,3-butadiene is to be limited in industrial applications in view of its high hazard potential with regard to toxicity and its extreme flammability (see Physical Hazard Information). Strict controls, PPE and specific plant designs are needed to reduce risks. As there are no consumer uses known for butadiene, consumer exposure is likely to be very low. The primary route of human exposure is by inhalation. Exposure that might occur from residual 1,3-
butadiene in e.g. plastic products is expected to be very low. For further details, see Exposure Potential.

- 1,3-Butadiene is regarded as a carcinogen by international agencies like the International Agency for Research on Cancer (IARC). For further details, see Health Information.
- No data are available on toxicity in aquatic organisms, as testing is not possible. Modelling predictions indicate a low concern for aquatic toxicity. For further details, see Environmental Information.

Manufacture of Product

- **Capacity** – The global 1,3-butadiene demand was > 1,000,000 t/a in 2010.
- **Process** – 1,3-Butadiene is predominantly isolated from C4 hydrocarbon fractions that are produced during the steam cracking of hydrocarbons. Butadiene is separated from crude C4 fractions by extractive distillation.

Product Description

SABIC’s 1,3-butadiene is a colourless (liquefied) gas with an aromatic characteristic odor. It is a reactive monomer when not stored under recommended storage conditions, and is therefore usually supplied in a stabilized form. 1,3-Butadiene has a limited water solubility of 0.735 g/L and is highly volatile with a vapour pressure of 255 kPa. 1,3-Butadiene is extremely flammable. It is a gas at ambient temperature and pressure.

Product Uses

1,3-Butadiene is used as a chemical intermediate and as a monomer in the manufacture of polymers such as synthetic rubbers or elastomers, including styrene-butadiene rubber (SBR) and nitrile-butadiene rubber (NBR). These rubbers are used to produce other products and materials:

- SBR is used in automobile and truck tyres, as well as in carpet backing and paper coating. Other applications are in belting, flooring, footwear, and wire and cable insulation.
- NBR is used in automotive transmission belts, hoses, gloves, gaskets and seals.

It is also used as a copolymer to produce acrylonitrile butadiene styrene (ABS), for applications as car bumpers.

Exposure Potential

1,3-Butadiene is used in industrial settings where it is reacted in closed systems during the chemical production of polymers. There is therefore only limited potential for human and environmental exposure to occur. A major non-industrial source is the combustion of fuel, an a major natural source is forest fires.

**Consumer exposure to products containing 1,3-butadiene** - There are no consumer uses known for 1,3-butadiene. Consumer exposure will mainly occur through (residual) cigarette smoke. Although some consumer exposure may occur through dermal contact with products containing 1,3-butadiene residues, or after eating food that has been in contact with packaging materials.
containing 1,3-butadiene, this exposure is, in view of the very low levels of 1,3-butadiene, so limited that it is of low concern. See Health information.

**Workplace exposure**- Exposure can occur either in facilities that manufacture 1,3-butadiene or in the various industrial or manufacturing facilities that use 1,3-butadiene. 1,3-butadiene is produced, distributed, stored and consumed in closed systems. Those working with 1,3-butadiene in manufacturing operations could be exposed during maintenance, sampling, testing or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation and safety equipment in place to limit exposure. Controls should ensure compliance with Occupational Exposure Limits that were set by local regulatory authorities. See Health information.

**Environmental release**- 1,3-Butadiene can be released during manufacture, storage and use. The exposure of aquatic, terrestrial, sediment and sewage treatment microorganisms is considered to be negligible because the substance partitions primarily to air when present in the environment. Emission of butadiene to the air compartment is regulated by the VOC directive and the carcinogen directive. The limits in place of both of these directives would also limit exposure to ecological receptors. Hence the risks are considered to be controlled for ecological receptors. See Environmental, Health and Physical hazard information.

**Health Information**

**Inhalation**- Potential human exposure will mostly occur by inhalation. Butadiene vapors may be mildly irritating to the nose, throat and respiratory tract. In confined or poorly ventilated areas, 1,3-butadiene vapours can accumulate and cause dizziness, headaches and nausea. High concentrations may cause central nervous system (CNS) depression and finally asphyxiation.

**Contact and Ingestion**- 1,3-Butadiene is of a low order of acute toxicity. As it is an extremely cold material, contact with skin and eyes can cause burns similar to frostbite.

**Carcinogenicity / Toxicity** – 1,3-Butadiene is classified as a carcinogen according to the International Agency for Research on Cancer (IARC); it has been shown to cause cancer in laboratory animals. Furthermore, 1,3-butadiene may cause genetic defects. Based on results from epidemiological studies, it also regarded as is a genotoxic human carcinogen.

**Environmental Information**

Because of its high vapour pressure, 1,3-butadiene is not expected to be found in soil or water. No data could be generated on toxicity in aquatic organisms, due to the low water solubility and high volatility of 1,3-butadiene. Modelling shows only limited potential for toxicity to fish, algae and daphnids. Test on terrestrial plants have also shown general low toxicity to plants. It is not expected to bioaccumulate and is ready biodegradable.
Physical Hazard Information

1,3-Butadiene is extremely flammable and as a result of its high vapour pressure it can form explosive mixtures in air, with lower and upper limits of 2 and 12 %, respectively. It should therefore be kept away from heat, flames, sparks, open flames, hot surfaces and sources of ignition. If the permissible storage period and/or storage temperature is noticeably exceeded, the product may polymerize with heat evolution. 1,3-butadiene may react with oxygen to form unstable butadiene peroxides. Butadiene peroxides are thermally unstable, shock sensitive and may lead to the formation of popcorn polymer.

Back to top

Regulatory Information

Regulations exist that govern the manufacture, sale, transportation, use, and/or physical disposal of 1,3-butadiene. These regulations may vary by city, state, country or geographic region. Additional information may be found by requesting the relevant Safety Data Sheet.

Classification and Labeling: Substances may be classified according to their physical, health and environmental hazards. Identified hazards may then be communicated via specific labels on the product packaging and the Safety Data Sheet, as well as for transport. Under the initiative of the Globally Harmonized System (GHS), hazard classification and labeling is standardized across countries so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use. Information on the classification and labeling of this substance is available in the regional (Material) Safety Data Sheet. See Additional Information.

Back to top

Additional Information

A Safety Data Sheet can be made available by contacting the regional SABIC Customer Service Center. Further information can be found at http://www.sabic.com .

Modification of this Safety Summary, unless specifically authorized by SABIC, is strictly prohibited. Unlike a Safety Data Sheet, SABIC makes no commitment to update or correct any information that appears in this Safety Summary.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.