

1,3-butadiene, buta-1,3-diene

Safety Data Sheet P-4571

This SDS conforms to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication.

Date of issue: 01/01/1979 Revision date: 01/16/2019 Supersedes: 10/13/2016

SECTION: 1. Product and company identification

1.1. Product identifier

Product form : Substance
 Substance name : 1,3-butadiene, buta-1,3-diene
 CAS-No. : 106-99-0
 Formula : C₄H₆

1.2. Relevant identified uses of the substance or mixture and uses advised against

Use of the substance/mixture : Industrial use; Use as directed.

1.3. Details of the supplier of the safety data sheet

Praxair, Inc.
 10 Riverview Drive
 Danbury, CT 06810-6268 - USA
 T 1-800-772-9247 (1-800-PRAXAIR) - F 1-716-879-2146
www.praxair.com

1.4. Emergency telephone number

Emergency number : Onsite Emergency: 1-800-645-4633

CHEMTREC, 24hr/day 7days/week
 — Within USA: 1-800-424-9300, Outside USA: 001-703-527-3887
 (collect calls accepted, Contract 17729)

SECTION 2: Hazard identification

2.1. Classification of the substance or mixture

GHS US classification

Flam. Gas 1 H220
 Press. Gas (Liq.) H280
 Skin Irrit. 2 H315
 Eye Irrit. 2A H319
 Muta. 1B H340
 Carc. 1A H350

2.2. Label elements

GHS US labeling

Hazard pictograms (GHS US) :



GHS02

GHS04

GHS07

GHS08

Signal word (GHS US) :

Danger

Hazard statements (GHS US) :

H220 - EXTREMELY FLAMMABLE GAS
 H280 - CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED
 H340 - May cause genetic defects
 H350 - MAY CAUSE CANCER (Inhalation)
 CGA-HG04 - MAY FORM EXPLOSIVE MIXTURES WITH AIR
 CGA-HG01 - MAY CAUSE FROSTBITE.

Precautionary statements (GHS US) :

P201 - Obtain special instructions before use.
 P202 - Do not handle until all safety precautions have been read and understood.
 P210 - Keep away from Heat, Open flames, Sparks, Hot surfaces. - No smoking
 P261 - Avoid breathing gas
 P262 - Do not get in eyes, on skin, or on clothing.
 P271+P403 - Use and store only outdoors or in a well-ventilated place.
 P280+P284 - Wear protective gloves, protective clothing, eye protection, respiratory protection,

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and/or face protection.
P308 - IF EXPOSED OR CONCERNED:
P313 - Get medical advice/attention.
P305 - IF IN EYES:
P351 - Rinse cautiously with water for several minutes.
P338 - Remove contact lenses, if present and easy to do. Continue rinsing.
P302 - IF ON SKIN:
P361 - Take off immediately all contaminated clothing.
P336 - Thaw frosted parts with lukewarm water. Do not rub affected area.
P315 - Get immediate medical advice/attention.
P377 - LEAKING GAS FIRE: Do not extinguish, unless leak can be stopped safely.
P381 - Eliminate all ignition sources if safe to do so.
P405 - Store locked up.
P501 - Dispose of contents/container in accordance with container Supplier/owner instructions
CGA-PG05 - Use a back flow preventive device in the piping.
CGA-PG12 - Do not open valve until connected to equipment prepared for use.
CGA-PG06 - Close valve after each use and when empty.
CGA-PG02 - Protect from sunlight when ambient temperature exceeds 52°C (125°F).

2.3. Other hazards

Other hazards not contributing to the classification : None.

2.4. Unknown acute toxicity (GHS US)

No data available

SECTION 3: Composition/Information on ingredients

3.1. Substances

Name	Product identifier	%
1,3-butadiene, buta-1,3-diene (Main constituent)	(CAS.No.) 106-99-0	100

3.2. Mixtures

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

First-aid measures after inhalation : Remove to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. If breathing is difficult, trained personnel should give oxygen. Call a physician.

First-aid measures after skin contact : The liquid may cause frostbite. For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). Water temperature should be tolerable to normal skin. Maintain skin warming for at least 15 minutes or until normal coloring and sensation have returned to the affected area. In case of massive exposure, remove clothing while showering with warm water. Seek medical evaluation and treatment as soon as possible.

First-aid measures after eye contact : Immediately flush eyes thoroughly with water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. Contact an ophthalmologist immediately..

First-aid measures after ingestion : Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed

No additional information available

4.3. Indication of any immediate medical attention and special treatment needed

None. Obtain medical assistance.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : Carbon dioxide, Dry chemical, Water spray or fog.

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5.2. Special hazards arising from the substance or mixture

- Fire hazard : EXTREMELY FLAMMABLE GAS. If venting or leaking gas catches fire, do not extinguish flames. Flammable vapors may spread from leak, creating an explosive reignition hazard. Vapors can be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharge, or other ignition sources at locations distant from product handling point. Explosive atmospheres may linger. Before entering an area, especially a confined area, check the atmosphere with an appropriate device.
- Explosion hazard : EXTREMELY FLAMMABLE GAS. Forms explosive mixtures with air and oxidizing agents.
- Reactivity : No reactivity hazard other than the effects described in sub-sections below.

5.3. Advice for firefighters

- Firefighting instructions : Evacuate all personnel from the danger area. Use self-contained breathing apparatus (SCBA) and protective clothing. Immediately cool containers with water from maximum distance. Stop flow of gas if safe to do so, while continuing cooling water spray. Remove ignition sources if safe to do so. Remove containers from area of fire if safe to do so. On-site fire brigades must comply with OSHA 29 CFR 1910.156 and applicable standards under 29 CFR 1910 Subpart L—Fire Protection.
- Protection during firefighting : Compressed gas: asphyxiant. Suffocation hazard by lack of oxygen.
- Special protective equipment for fire fighters : Standard protective clothing and equipment (Self Contained Breathing Apparatus) for fire fighters. Wear gas tight chemically protective clothing in combination with self contained breathing apparatus.
- Specific methods : Use fire control measures appropriate for the surrounding fire. Exposure to fire and heat radiation may cause gas containers to rupture. Cool endangered containers with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.
- Stop flow of product if safe to do so.
- Use water spray or fog to knock down fire fumes if possible.
- Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
- Other information : Containers are equipped with a pressure relief device. (Exceptions may exist where authorized by DOT.).

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

- General measures : **Danger: Flammable, liquefied gas.** FORMS EXPLOSIVE MIXTURES WITH AIR. Immediately evacuate all personnel from danger area. Use self-contained breathing apparatus where needed. Remove all sources of ignition if safe to do so. Reduce vapors with fog or fine water spray, taking care not to spread liquid with water. Shut off flow if safe to do so. Ventilate area or move container to a well-ventilated area. Flammable vapors may spread from leak and could explode if reignited by sparks or flames. Explosive atmospheres may linger. Before entering area, especially confined areas, check atmosphere with an appropriate device.

6.1.1. For non-emergency personnel

No additional information available

6.1.2. For emergency responders

No additional information available

6.2. Environmental precautions

Try to stop release. Reduce vapor with fog or fine water spray. Prevent waste from contaminating the surrounding environment. Prevent soil and water pollution. Dispose of contents/container in accordance with local/regional/national/international regulations. Contact supplier for any special requirements.

6.3. Methods and material for containment and cleaning up

No additional information available

6.4. Reference to other sections

See also sections 8 and 13.

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SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling :
- Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use only non-sparking tools. Use only explosion-proof equipment.
 - Ensure equipment is adequately grounded.
 - Leak-check system with soapy water; never use a flame.
 - Wear leather safety gloves and safety shoes when handling cylinders. Protect cylinders from physical damage; do not drag, roll, slide or drop. While moving cylinder, always keep in place removable valve cover. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders. Never insert an object (e.g, wrench, screwdriver, pry bar) into cap openings; doing so may damage the valve and cause a leak. Use an adjustable strap wrench to remove over-tight or rusted caps. Open the valve slowly. If the valve is hard to open, discontinue use and contact your supplier. Close the container valve after each use; keep closed even when empty. Never apply flame or localized heat directly to any part of the container. High temperatures may damage the container and could cause the pressure relief device to activate prematurely, venting the container contents. For other precautions in using this product, see section 16.

7.2. Conditions for safe storage, including any incompatibilities

- Storage conditions :
- Store only where temperature will not exceed 125°F (52°C). Post "No Smoking/No Open Flames" signs in storage and use areas. There must be no sources of ignition. Separate packages and protect against potential fire and/or explosion damage following appropriate codes and requirements (e.g, NFPA 30, NFPA 55, NFPA 70, and/or NFPA 221 in the U.S.) or according to requirements determined by the Authority Having Jurisdiction (AHJ). Always secure containers upright to keep them from falling or being knocked over. Install valve protection cap, if provided, firmly in place by hand when the container is not in use. Store full and empty containers separately. Use a first-in, first-out inventory system to prevent storing full containers for long periods. For other precautions in using this product, see section 16.

OTHER PRECAUTIONS FOR HANDLING, STORAGE, AND USE: When handling product under pressure, use piping and equipment adequately designed to withstand the pressures to be encountered. Never work on a pressurized system. Use a back flow preventive device in the piping. Gases can cause rapid suffocation because of oxygen deficiency; store and use with adequate ventilation. If a leak occurs, close the container valve and blow down the system in a safe and environmentally correct manner in compliance with all international, federal/national, state/provincial, and local laws; then repair the leak. Never place a container where it may become part of an electrical circuit.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

1,3-butadiene, buta-1,3-diene (106-99-0)		
ACGIH	ACGIH TLV-TWA (ppm)	2 ppm
USA OSHA	OSHA PEL (TWA) (ppm)	1 ppm
USA OSHA	OSHA PEL (STEL) (ppm)	5 ppm (see 29 CFR 1910.1051)
USA IDLH	US IDLH (ppm)	2000 ppm (10% LEL)

8.2. Exposure controls

- Appropriate engineering controls :
- This product must be confined with vapor-tight equipment. With this confinement, vapors should not be released, and local exhaust should be satisfactory. An explosion-proof system is acceptable. Ensure that any venting of material is in compliance with international, federal/national, state/provincial, and local regulations.
- Hand protection :
- Wear protective gloves made of PVC..
- Eye protection :
- Wear safety glasses with side shields. Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections. Provide readily accessible eye wash stations and safety showers.

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Skin and body protection	: Wear work gloves and metatarsal shoes for cylinder handling. Protective equipment where needed. Select in accordance with OSHA 29 CFR 1910.132, 1910.136, and 1910.138.
Respiratory protection	: When workplace conditions warrant respirator use, follow a respiratory protection program that meets OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable). Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure that the respirator has the appropriate protection factor for the exposure level. If cartridge type respirators are used, the cartridge must be appropriate for the chemical exposure. For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus (SCBA).
Environmental exposure controls	: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment. Refer to local regulations for restriction of emissions to the atmosphere.
Other information	: Consider the use of flame resistant anti-static safety clothing. Wear safety shoes while handling containers. Keep suitable chemically resistant protective clothing readily available for emergency use. Wear leather safety gloves and safety shoes when handling cylinders.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Appearance	: Colorless gas.
Molecular mass	: 54 g/mol
Color	: Colorless.
Odor	: Mildly aromatic. Poor warning properties at low concentrations.
Odor threshold	: Odor threshold is subjective and inadequate to warn for overexposure. 1 mg/m ³ (Hellman and Small)
pH	: Not applicable.
Relative evaporation rate (butyl acetate=1)	: > 25
Relative evaporation rate (ether=1)	: Not applicable.
Melting point	: -109 °C
Freezing point	: No data available
Boiling point	: -4.4 °C
Flash point	: -76.1 °C (TCC ASTM D56)
Critical temperature	: 151.9 °C
Auto-ignition temperature	: 418.9 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: 2 - 11.5 vol %
Vapor pressure	: 240 kPa
Critical pressure	: 4330 kPa
Relative vapor density at 20 °C	: No data available
Relative density	: 0.65
Density	: 0.6149 g/cm ³ (at 25 °C)
Relative gas density	: 1.9
Solubility	: Water: 1025 mg/l
Log Pow	: 1.99
Log Kow	: Not applicable.
Viscosity, kinematic	: Not applicable.
Viscosity, dynamic	: Not applicable.
Explosive properties	: Not applicable.
Oxidizing properties	: None.
Explosion limits	: No data available

9.2. Other information

Gas group	: Press. Gas (Liq.)
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Additional information : Gas/vapor heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity

No reactivity hazard other than the effects described in sub-sections below.

10.2. Chemical stability

May polymerise. Inhibitor usually added. Stable under normal conditions.

10.3. Possibility of hazardous reactions

May occur. May react violently with oxidants. Can form explosive mixture with air.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. – No smoking. Rusty iron. Exposure to air may form spontaneously flammable or explosive peroxides.

10.5. Incompatible materials

Oxidizing agent. Acids. Halogens. Sulphur dioxide.

10.6. Hazardous decomposition products

Thermal decomposition may produce : Carbon monoxide. Carbon dioxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Not classified

1,3-butadiene, buta-1,3-diene (f)106-99-0	
LD50 oral rat	5480 mg/kg
LC50 inhalation rat (mg/l)	285 g/m ³ (Exposure time: 4 h)
LC50 inhalation rat (ppm)	220000 ppm/1h
ATE US (oral)	5480 mg/kg body weight
ATE US (vapors)	285 mg/l/4h
ATE US (dust, mist)	285 mg/l/4h

Skin corrosion/irritation : CAUSES SKIN IRRITATION.

pH: Not applicable.

Serious eye damage/irritation : CAUSES SERIOUS EYE IRRITATION.

pH: Not applicable.

Respiratory or skin sensitization : Not classified

Germ cell mutagenicity : May cause genetic defects.

Carcinogenicity : MAY CAUSE CANCER (Inhalation).

1,3-butadiene, buta-1,3-diene (106-99-0)	
IARC group	1 - Carcinogenic to humans
National Toxicology Program (NTP) Status	2 - Known Human Carcinogens

Reproductive toxicity : Not classified

Specific target organ toxicity – single exposure : Not classified

Specific target organ toxicity – repeated exposure : Not classified

Aspiration hazard : Not classified

SECTION 12: Ecological information

12.1. Toxicity

Ecology - general : No ecological damage caused by this product.

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12.2. Persistence and degradability

1,3-butadiene, buta-1,3-diene (106-99-0)

Persistence and degradability	Not readily biodegradable.
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12.3. Bioaccumulative potential

1,3-butadiene, buta-1,3-diene (106-99-0)

BCF fish 1	13 - 19.1
Log Pow	1.99
Log Kow	Not applicable.
Bioaccumulative potential	Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9.

12.4. Mobility in soil

1,3-butadiene, buta-1,3-diene (106-99-0)

Mobility in soil	No data available.
Ecology - soil	Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Other adverse effects

Other adverse effects : May cause pH changes in aqueous ecological systems.
 Effect on ozone layer : None.
 Effect on the global warming : No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Product/Packaging disposal recommendations : Do not attempt to dispose of residual or unused quantities. Return container to supplier.

SECTION 14: Transport information

In accordance with DOT

Transport document description : UN1010 Butadienes, stabilized, 2.1
 UN-No.(DOT) : UN1010
 Proper Shipping Name (DOT) : Butadienes, stabilized
 Class (DOT) : 2.1 - Class 2.1 - Flammable gas 49 CFR 173.115
 Hazard labels (DOT) : 2.1 - Flammable gas



DOT Special Provisions (49 CFR 172.102) : T50 - When portable tank instruction T50 is referenced in Column (7) of the 172.101 Table, the applicable liquefied compressed gases are authorized to be transported in portable tanks in accordance with the requirements of 173.313 of this subchapter.

Additional information

Other information : No supplementary information available.
 Special transport precautions : Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers:
 - Ensure there is adequate ventilation. - Ensure that containers are firmly secured. - Ensure cylinder valve is closed and not leaking. - Ensure valve outlet cap nut or plug (where provided) is correctly fitted. - Ensure valve protection device (where provided) is correctly fitted.

Transport by sea

UN-No. (IMDG) : 1010
 Proper Shipping Name (IMDG) : BUTADIENES, STABILIZED
 Class (IMDG) : 2 - Gases

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Division (IMDG) : 2.1 - Flammable gases
MFAG-No : 116P

Air transport

UN-No. (IATA) : 1010
Proper Shipping Name (IATA) : Butadienes, stabilized
Class (IATA) : 2
Civil Aeronautics Law : Gases under pressure/Gases flammable under pressure

SECTION 15: Regulatory information

15.1. US Federal regulations

1,3-butadiene, buta-1,3-diene (106-99-0)	
Listed on the United States TSCA (Toxic Substances Control Act) inventory	
Subject to reporting requirements of United States SARA Section 313	
CERCLA RQ	10 lb
SARA Section 311/312 Hazard Classes	Immediate (acute) health hazard Delayed (chronic) health hazard Sudden release of pressure hazard Reactive hazard Fire hazard
SARA Section 313 - Emission Reporting	0.1 %

15.2. International regulations

CANADA

1,3-butadiene, buta-1,3-diene (106-99-0)
Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

1,3-butadiene, buta-1,3-diene (106-99-0)
Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

15.2.2. National regulations

1,3-butadiene, buta-1,3-diene (106-99-0)
Listed on IARC (International Agency for Research on Cancer)
Listed on the AICS (Australian Inventory of Chemical Substances)
Listed on IECSC (Inventory of Existing Chemical Substances Produced or Imported in China)
Listed on the Japanese ENCS (Existing & New Chemical Substances) inventory
Listed on the Japanese ISHL (Industrial Safety and Health Law)
Listed on the Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)
Japanese Pollutant Release and Transfer Register Law (PRTR Law)
Listed as carcinogen on NTP (National Toxicology Program)
Listed on the Canadian IDL (Ingredient Disclosure List)
Listed on INSQ (Mexican National Inventory of Chemical Substances)
Listed on EPA Hazardous Air Pollutant (HAPS)
Listed on the TCSI (Taiwan Chemical Substance Inventory)

15.3. US State regulations

1,3-butadiene, buta-1,3-diene(106-99-0)	
U.S. - California - Proposition 65 - Carcinogens List	Yes
U.S. - California - Proposition 65 - Developmental Toxicity	Yes

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U.S. - California - Proposition 65 - Reproductive Toxicity - Female	Yes
U.S. - California - Proposition 65 - Reproductive Toxicity - Male	Yes
No significant risk level (NSRL)	0.4 µg/day
State or local regulations	U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) - Environmental Hazard List U.S. - Pennsylvania - RTK (Right to Know) - Special Hazardous Substances U.S. - Pennsylvania - RTK (Right to Know) List

SECTION 16: Other information

Other information : Prior to using any plastics, confirm their compatibility with this chemical.

When you mix two or more chemicals, you can create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an industrial hygienist or other trained person when you evaluate the end product. Before using any plastics, confirm their compatibility with this product.

Praxair asks users of this product to study this SDS and become aware of the product hazards and safety information. To promote safe use of this product, a user should (1) notify employees, agents, and contractors of the information in this SDS and of any other known product hazards and safety information, (2) furnish this information to each purchaser of the product, and (3) ask each purchaser to notify its employees and customers of the product hazards and safety information.

The opinions expressed herein are those of qualified experts within Praxair, Inc. We believe that the information contained herein is current as of the date of this Safety Data Sheet. Since the use of this information and the conditions of use are not within the control of Praxair, Inc, it is the user's obligation to determine the conditions of safe use of the product.

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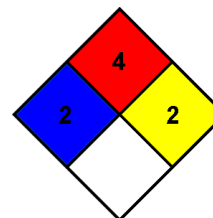
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Revision date : 01/16/2019

NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

NFPA fire hazard : 4 - Materials that rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and burn readily.

NFPA reactivity : 2 - Materials that readily undergo violent chemical change at elevated temperatures and pressures.



SDS US (GHS HazCom 2012) - Praxair

This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.