

# Praxair Material Safety Data Sheet

## 1. Chemical Product and Company Identification

**Product Name:** Butadienes, stabilized  
(MSDS No. P-4571-E)

**Trade Names:** 1,3-Butadiene

**Chemical Name:** 1,3-Butadiene (inhibited)

**Synonyms:** Alpha-gamma-butadiene; biethylene; bivinyll; bivinyll butadiene; buta-1,3-diene; butadiene; divinylerythrene; pyrrolylene; vinylethylene

**Chemical Family:** Diene

**Product Grades:** 2.0, 2.5-Instrument

**Telephone:** **Emergencies:** 1-800-645-4633\*

**Company Name:** Praxair, Inc.

**CHEMTREC:** 1-800-424-9300\*

39 Old Ridgebury Road

**Routine:** 1-800-PRAXAIR

Danbury, CT 06810-5113

*\*Call emergency numbers 24 hours a day only for spills, leaks, fire, exposure, or accidents involving this product. For routine information, contact your supplier, Praxair sales representative, or call 1-800-PRAXAIR (1-800-772-9247).*

## 2. Hazards Identification

### EMERGENCY OVERVIEW

**DANGER! Cancer-suspect agent.**  
**Flammable liquid and gas under pressure.**  
**Can form explosive mixtures with air.**  
**May irritate the eyes, skin, and mucous membranes.**  
**May cause frostbite.**  
**May cause dizziness and drowsiness.**  
**Self-contained breathing apparatus may be required by rescue workers.**  
**Under ambient conditions, this is a colorless gas with a mild, aromatic odor.**

**OSHA REGULATORY STATUS:** This material is considered hazardous by the OSHA Hazard Communications Standard (29 CFR 1910.1200).

### POTENTIAL HEALTH EFFECTS:

#### Effects of a Single (Acute) Overexposure

**Inhalation.** May irritate the respiratory tract with nausea, vomiting, blurred vision, headache, fatigue, and unconsciousness. Lack of oxygen can kill.

**Skin Contact.** May cause irritation, with redness and possible swelling. Liquid may cause frostbite.

**Swallowing.** An unlikely route of exposure. This product is a gas at normal temperature and pressure, but frostbite of the lips and mouth may result from contact with the liquid

**Eye Contact.** May irritate the eyes, with redness and excess tearing. Liquid may cause freezing.

**Effects of Repeated (Chronic) Overexposure.** Repeated skin exposure may cause dermatitis. Repeated exposure to butadiene vapor may cause kidney and liver injury.

**Other Effects of Overexposure.** None known.

**Medical Conditions Aggravated by Overexposure.** Inhalation may aggravate asthma and inflammatory or fibrotic pulmonary disease. The skin irritating properties of 1,3-butadiene may aggravate an existing dermatitis.

**CARCINOGENICITY:** The ACGIH classifies 1,3-butadiene as "Group A2, suspected human carcinogen." NTP lists it as group A, "known to be a human carcinogen." IARC lists it as "Group 1, carcinogenic in humans." An OSHA Standard, 29 CFR 1910.1051, has been published for 1,3-butadiene.

**POTENTIAL ENVIRONMENTAL EFFECTS:** None known. For further information, see section 12, Ecological Information.

### 3. Composition/Information on Ingredients

See section 16 for important information about mixtures.

COMPONENT	CAS NUMBER	CONCENTRATION
1,3-Butadiene	106-99-0	>99%*

\*The symbol > means "greater than."

### 4. First Aid Measures

**INHALATION:** Immediately remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, qualified personnel may give oxygen. Call a physician.

**SKIN CONTACT:** For exposure to liquid, immediately warm frostbite area with warm water not to exceed 105°F (41°C). In case of massive exposure, remove clothing while showering with warm water. Discard clothing and shoes. Call a physician.

**SWALLOWING:** An unlikely route of exposure. This product is a gas at normal temperature and pressure.

**EYE CONTACT:** For contact with the liquid, immediately flush eyes thoroughly with warm water for at least 15 minutes. Hold the eyelids open and away from the eyeballs to ensure that all surfaces are flushed thoroughly. See a physician, preferably an ophthalmologist, immediately.

**NOTES TO PHYSICIAN:** *There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.*

### 5. Fire Fighting Measures

**FLAMMABLE PROPERTIES:** Flammable gas. Forms explosive mixtures with air and oxidizing agents.

**SUITABLE EXTINGUISHING MEDIA:** CO<sub>2</sub>, dry chemicals, water spray, or fog.

**PRODUCTS OF COMBUSTION:** Carbon monoxide, carbon dioxide.

**PROTECTION OF FIREFIGHTERS: DANGER! Suspect cancer agent. Flammable liquid and gas under pressure.** Evacuate all personnel from danger area. Immediately spray cylinders with water from maximum distance until cool, taking care not to extinguish flames. Remove sources of ignition if without risk. Remove all cylinders from fire area if without risk;

continue cooling water spray while moving cylinders. Do not extinguish any flames emitted from cylinders; stop flow of gas if without risk, or allow flames to burn out. Self-contained breathing apparatus may be required by rescue workers. On-site fire brigades must comply with OSHA 29 CFR 1910.156.

**Specific Physical and Chemical Hazards.** Flammable gas. Forms explosive mixtures with air and oxidizing agents. Heat of fire can build pressure in cylinder and cause it to rupture. No part of a cylinder should be subjected to a temperature higher than 125°F (52°C). Cylinders containing 1,3-butadiene are equipped with pressure relief devices. (Exceptions may exist where authorized by DOT.) If venting or leaking product catches fire, do not extinguish flames. Flammable gas 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 area, especially confined areas, check atmosphere with an appropriate device.

**Protective Equipment and Precautions for Firefighters.** Firefighters should wear self-contained breathing apparatus and full fire-fighting turnout gear.

## 6. Accidental Release Measures

### STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

**DANGER! Suspect cancer agent. Flammable liquid and gas under pressure.**

**Personal Precautions.** 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 without risk. Reduce vapors with fog or fine water spray. Shut off flow if without risk. Ventilate area or move cylinder to a well-ventilated area. Flammable vapors may spread from leak. Before entering area, especially confined areas, check atmosphere with an appropriate device.

**Environmental Precautions.** Prevent waste from contaminating the surrounding environment. Keep personnel away. Discard any product, residue, disposable container, or liner in an environmentally acceptable manner, in full compliance with federal, state, and local regulations. If necessary, call your local supplier for assistance.

## 7. Handling and Storage

**PRECAUTIONS TO BE TAKEN IN HANDLING:** Keep away from heat, sparks, and open flame. **Gas can cause rapid suffocation due to oxygen deficiency.** Protect cylinders from damage. Use a suitable hand truck to move cylinders; do not drag, roll, slide, or drop. All piped 1,3-butadiene systems and associated equipment must be grounded. Electrical equipment must be non-sparking or explosion-proof. Leak check system with soapy water; never use a flame. Never attempt to lift a cylinder by its cap; the cap is intended solely to protect the valve. 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 valve slowly. If valve is hard to open, discontinue use and contact your supplier. For other precautions in using 1,3-butadiene, see section 16.

**PRECAUTIONS TO BE TAKEN IN STORAGE:** Store and use with adequate ventilation. Separate 1,3-butadiene cylinders from oxygen, chlorine, and other oxidizers by at least 20 ft (6.1 m) or use a barricade of noncombustible material. This barricade should be at least 5 ft (1.53 m) high and have a fire resistance rating of at least ½ hour. Firmly secure cylinders

upright to keep them from falling or being knocked over. Screw valve protection cap firmly in place by hand. Post "No Smoking or Open Flames" signs in storage and use areas. There must be no sources of ignition. All electrical equipment in storage areas must be explosion-proof. Storage areas must meet national electric codes for Class 1 hazardous areas. Store only where temperature will not exceed 125°F (52°C). Store full and empty cylinders separately. Use a first-in, first-out inventory system to prevent storing full cylinders for long periods.

**RECOMMENDED PUBLICATIONS:** For further information on storage, handling, and use, see Praxair publication P-14-153, *Guidelines for Handling Gas Cylinders and Containers*. Obtain from your local supplier.

## 8. Exposure Controls/Personal Protection

COMPONENT	OSHA PEL	ACGIH TLV-TWA (2008)
1,3-Butadiene	1 ppm; 5 ppm, 15 min STEL	2 ppm

TLV-TWAs should be used as a guide in the control of health hazards and not as fine lines between safe and dangerous concentrations.

IDLH = 2000 ppm

### ENGINEERING CONTROLS:

**Local Exhaust.** See SPECIAL.

**Mechanical (General).** See SPECIAL.

**Special.** This product must be confined with vapor-tight equipment. Confined in this way, vapors should not be released and local exhaust should be satisfactory. An explosion-proof system is acceptable. Venting of material must be in compliance with federal, state, and local regulations.

**Other.** See SPECIAL.

### PERSONAL PROTECTIVE EQUIPMENT:

**Skin Protection.** Wear work gloves for cylinder handling; polyvinyl chloride gloves when changing out cylinders or wherever contact with product is possible. Metatarsal shoes for cylinder handling. Protective equipment where needed. Select in accordance with OSHA 29 CFR 1910.132 and 1910.133. Regardless of protective equipment, never touch live electrical parts.

**Eye/Face Protection.** Select in accordance with OSHA 29 CFR 1910.133.

**Respiratory Protection.** A respiratory protection program that meet OSHA 29 CFR 1910.134, ANSI Z88.2, or MSHA 30 CFR 72.710 (where applicable) requirements must be followed whenever workplace conditions warrant respirator use. Use an air-supplied or air-purifying cartridge if the action level is exceeded. Ensure 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 (e.g., an organic vapor cartridge). For emergencies or instances with unknown exposure levels, use a self-contained breathing apparatus. Refer to OSHA 29 CFR 1910.1051 for respiratory protection requirements.

### 9. Physical and Chemical Properties

<b>APPEARANCE:</b>	Colorless gas
<b>ODOR:</b>	Mild, aromatic odor
<b>ODOR THRESHOLD:</b>	Above 1.3 ppm
<b>PHYSICAL STATE:</b>	Gas at normal temperature and pressure
<b>pH:</b>	Not applicable.
<b>MELTING POINT</b> at 1 atm:	-164.05°F (-108.92°C)
<b>BOILING POINT</b> at 1 atm:	24.046°F (-4.419°C)
<b>FLASH POINT</b> (test method):	-105°F (-76.1°C) TCC ASTM D56
<b>EVAPORATION RATE</b> (Butyl Acetate = 1):	High
<b>FLAMMABILITY:</b>	Flammable
<b>FLAMMABLE LIMITS IN AIR</b> , % by volume:	<b>LOWER:</b> 2% <b>UPPER:</b> 11.5%
<b>VAPOR PRESSURE</b> at 70°F (21.1°C):	36.1 psia (249 kPa abs)
<b>VAPOR DENSITY</b> at 70°F (21.1°C) and 1 atm:	0.1399 lb/ft <sup>3</sup> (2.240 kg/m <sup>3</sup> )
<b>SPECIFIC GRAVITY</b> (H <sub>2</sub> O = 1) at 68°F (20°C) and 1 atm:	0.621
<b>SPECIFIC GRAVITY</b> (Air = 1) at 60°F (15.6°C) and 1 atm:	1.87
<b>SOLUBILITY IN WATER</b> , % by wt at 74°F (23.3°C) and 1 atm:	0.0501%
<b>PARTITION COEFFICIENT: n-octanol/water:</b>	Not available.
<b>AUTOIGNITION TEMPERATURE:</b>	804°F (428.9°C)
<b>DECOMPOSITION TEMPERATURE:</b>	Not available.
<b>PERCENT VOLATILES BY VOLUME:</b>	100
<b>MOLECULAR WEIGHT:</b>	54.092
<b>MOLECULAR FORMULA:</b>	C <sub>4</sub> H <sub>6</sub>

### 10. Stability and Reactivity

**CHEMICAL STABILITY:**     Unstable     Stable

**CONDITIONS TO AVOID:** Elevated temperatures. Contact with rusty iron. Exposure to air may form spontaneously flammable or explosive peroxides.

**INCOMPATIBLE MATERIALS:** Oxidizing agents, acids, halogens, sulfur dioxide, phenol, protopaldehyde.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Thermal decomposition and burning may produce CO/CO<sub>2</sub>.

**POSSIBILITY OF HAZARDOUS REACTIONS:**     May Occur     Will Not Occur

Thermal decomposition and burning may produce CO/CO<sub>2</sub>.

### 11. Toxicological Information

**ACUTE DOSE EFFECTS:** LC<sub>50</sub> = 220,000 ppm.

**STUDY RESULTS:** This material has been shown to cause cancer in experimental animals (NTP). This indicates that 1,3-butadiene is an animal carcinogen. Several independent studies have shown that 1,3-butadiene causes mutations in bacteria.

### 12. Ecological Information

**ECOTOXICITY:** No known effects.

**OTHER ADVERSE EFFECTS:** This material does not contain any Class I or Class II ozone-depleting chemicals.

### 13. Disposal Considerations

**WASTE DISPOSAL METHOD:** Do not attempt to dispose of residual or unused quantities. Return cylinder to supplier.

### 14. Transport Information

**DOT/IMO SHIPPING NAME:** Butadienes, stabilized

HAZARD CLASS:	PACKING GROUP/Zone:	IDENTIFICATION NUMBER:	PRODUCT RQ:
2.1	NA*	UN1010	10 lb (4.54 kg)

**SHIPPING LABEL(s):** FLAMMABLE GAS

**PLACARD (when required):** FLAMMABLE GAS

\*NA=Not applicable.

**SPECIAL SHIPPING INFORMATION:** Cylinders should be transported in a secure position, in a well-ventilated vehicle. Cylinders transported in an enclosed, nonventilated compartment of a vehicle can present serious safety hazards.

Shipment of compressed gas cylinders that have been filled without the owner's consent is a violation of federal law [49 CFR 173.301(b)].

**MARINE POLLUTANTS:** This material is not listed as a marine pollutant by DOT."

### 15. Regulatory Information

The following selected regulatory requirements may apply to this product. Not all such requirements are identified. Users of this product are solely responsible for compliance with all applicable federal, state, and local regulations.

#### U.S. FEDERAL REGULATIONS:

EPA (ENVIRONMENTAL PROTECTION AGENCY)

CERCLA: COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980 (40 CFR Parts 117 and 302):

**Reportable Quantity (RQ):** 10 lb (0.454 kg)

**SARA: SUPERFUND AMENDMENT AND REAUTHORIZATION ACT:**

**SECTIONS 302/304:** Require emergency planning based on Threshold Planning Quantity (TPQ) and release reporting based on Reportable Quantities (RQ) of Extremely Hazardous Substances (EHS) (40 CFR Part 355):

**TPQ:** None

**EHS RQ (40 CFR 355):** None

**SECTIONS 311/312:** Require submission of MSDSs and reporting of chemical inventories with identification of EPA hazard categories. The hazard categories for this product are as follows:

**IMMEDIATE:** Yes

**DELAYED:** Yes

**PRESSURE:** Yes

**REACTIVITY:** Yes

**FIRE:** Yes

**SECTION 313:** Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

1,3-Butadiene is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40CFR Part 372.

**40 CFR 68: RISK MANAGEMENT PROGRAM FOR CHEMICAL ACCIDENTAL RELEASE PREVENTION:** Requires development and implementation of risk management programs at facilities that manufacture, use, store, or otherwise handle regulated substances in quantities that exceed specified thresholds.

1,3-Butadiene is listed as a regulated substance in quantities of 10,000 lb (4536 kg) or greater.

**TSCA: TOXIC SUBSTANCES CONTROL ACT:** 1,3-Butadiene is listed on the TSCA inventory.

**OSHA: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION:**

**29 CFR 1910.119: PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS:** Requires facilities to develop a process safety management program based on Threshold Quantities (TQ) of highly hazardous chemicals.

1,3-Butadiene is not listed in Appendix A as a highly hazardous chemical. However, any process that involves a flammable gas on site in one location in quantities of 10,000 lb (4536 kg) or greater is covered under this regulation unless the gas is used as a fuel.

**STATE REGULATIONS:**

**CALIFORNIA:** 1,3-Butadiene is listed by California under the SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (Proposition 65).

**WARNING:** 1,3-Butadiene is a chemical known to the State of California to cause cancer.

*(California Health and Safety Code §25249.5 et seq.)*

**PENNSYLVANIA:** 1,3-Butadiene is subject to the PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT (35 P.S. Sections 7301-7320).

## 16. Other Information

Be sure to read and understand all labels and instructions supplied with all containers of this product.

**OTHER HAZARDOUS CONDITIONS OF HANDLING, STORAGE, AND USE: *Suspect cancer agent. Flammable liquid and gas under pressure.*** Use piping and equipment adequately designed to withstand pressures to be encountered. Use only in a closed system. Use only spark-proof tools and explosion-proof equipment. ***Prevent reverse flow.*** Reverse flow into cylinder may cause rupture. Use a check valve or other protective device in any line or piping from the cylinder. Store and use with adequate ventilation. Close valve after each use; keep closed even when empty. ***Never work on a pressurized system.*** If there is a leak, close the cylinder valve. Blow the system down in a safe and environmentally sound manner in compliance with all federal, state, and local laws; then repair the leak. ***Never place a compressed gas cylinder where it may become part of an electrical circuit.***

**NOTE:** Prior to using any plastics, confirm their compatibility with 1,3-butadiene.

**Mixtures.** When you mix two or more gases or liquefied gases, 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. Remember, gases and liquids have properties that can cause serious injury or death.

### HAZARD RATING SYSTEMS:

#### NFPA RATINGS:

HEALTH = 2  
FLAMMABILITY = 4  
INSTABILITY = 2  
SPECIAL = None

#### HMIS RATINGS:

HEALTH = 2\*  
FLAMMABILITY = 4  
PHYSICAL HAZARD = 2

\*This chemical presents a carcinogenic or reproductive hazard.

### STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

**THREADED:** CGA-510  
**PIN-INDEXED YOKE:** None  
**ULTRA-HIGH-INTEGRITY CONNECTION:** None

Use the proper CGA connections. **DO NOT USE ADAPTERS.** Additional limited-standard connections may apply. See CGA pamphlet V-1 listed below.



Ask your supplier about free Praxair safety literature as referred to in this MSDS and on the label for this product. Further information can be found in the following materials published by the Compressed Gas Association, Inc. (CGA), 4221 Walney Road, 5<sup>th</sup> Floor, Chantilly, VA 20151-2923, Telephone (703) 788-2700, <http://www.cganet.com/Publication.asp>.

- AV-1 *Safe Handling and Storage of Compressed Gases*
- P-1 *Safe Handling of Compressed Gases in Containers*
- P-2 *Characteristics and Safe Handling of Medical Gases*
- SB-2 *Oxygen-Deficient Atmospheres*
- V-1 *Compressed Gas Cylinder Valve Inlet and Outlet Connections*
- *Handbook of Compressed Gases, Fourth Edition*

Praxair asks users of this product to study this MSDS and become aware of 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 MSDS 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.

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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 Material Safety Data Sheet. Since the use of this information and the conditions of use of the product 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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