

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form	: Substance
Trade name	: 1,3-Butadiene
Chemical name	: Buta-1,3-diene
IUPAC name	: 1,3-butadiene
CAS No	: 106-99-0
Formula	: C4H6
Synonyms	: Butadiene, biethylene, biviny, divinyl, erythrene, vinylethylene

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

Use of the substance/mixture	: Polybutadiene, SBR (Styrene Butadiene Rubber) used for production of tires, shoe soles and Crawler; SSBR Solution, NBR, Acrylonitrile Butadiene Rubber (Aeronautical Material, Hoses, Fuel medical gloves), TR (TPR) Thermoplastic Rubber (Soles, Sandals)
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1.3. Details of the supplier of the safety data sheet

Braskem S.A.
5100 Westheimer Rd - Suite 495
Houston, 77056 - USA

Manufacturer:

Braskem S.A.
Rua Eteno, 1561, Polo Petroquímico de Camaçari
Camaçari, BA, CEP: 42810-000, Brasil

Braskem S.A.
Av. Presidente Costa e Silva, 1178 – Capuava
Santo André, SP, CEP: 09270-001, Brasil

Braskem S.A.
BR 386 – Rodovia Tabai-Canoas, km 419, Via do Contorno, 850
Triunfo, RS, CEP: 95853-000, Brasil

Contact Email : productsafety@braskem.com
Emergency Telephone Number (CHEMTREC) : 1-800-424-9300

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Flam. Gas 1 H220
Compressed gas H280
Muta. 1B H340
Carc. 1A H350

Full text of H-statements: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US)



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

Precautionary statements (GHS-US)

- H350 - May cause cancer
- : P201 - Obtain special instructions before use
 - P202 - Do not handle until all safety precautions have been read and understood
 - P210 - Keep away from heat, sparks, open flames, hot surfaces, No smoking. - No smoking
 - P280 - Wear eye protection, protective clothing, protective gloves
 - P308+P313 - If exposed or concerned: Get 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
 - P403 - Store in a well-ventilated place
 - P405 - Store locked up
 - P410+P403 - Protect from sunlight. Store in a well-ventilated place
 - P501 - Dispose of contents/container to comply with applicable local, national and international regulation.

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Name : 1,3-Butadiene
CAS No : 106-99-0

Name	Product identifier	%
1,3-butadiene, buta-1,3-diene	(CAS No) 106-99-0	> 99,5

Full text of H-statements: see section 16

3.2. Mixture

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

- First-aid measures after inhalation : Remove casualty to fresh air and keep warm and at rest. In case of irregular breathing or respiratory arrest provide artificial respiration. In case of breathing difficulties administer oxygen. Immediately get medical attention.
- First-aid measures after skin contact : Remove contaminated clothing and shoes. Rinse immediately with plenty of water (for at least 15 minutes). Seek medical advice. DO NOT attempt to remove the frozen clothing from the skin since removal could result in severe tissue damage. Clothing frozen to the skin should be thawed before being removed. Thaw frosted parts with lukewarm water. Do not rub affected area. Get immediate medical advice/attention. Seek medical attention immediately.
- First-aid measures after eye contact : Rinse immediately and plentifully with water, also under the eyelids, for at least 20 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical advice.

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

- Symptoms/injuries : Symptoms may include dizziness, headache, nausea and loss of coordination. Excessive amounts of magnesium may cause central nervous system depression, respiratory paralysis, and cardiac arrest.
- Symptoms/injuries after inhalation : May cause irritation to the respiratory tract. Irritation of mucous membranes. Asphyxiant in high concentrations. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness.
- Symptoms/injuries after skin contact : Repeated exposure may cause skin dryness or cracking. Skin rash/inflammation. Contact with the product may cause cold burns or frostbite.
- Symptoms/injuries after eye contact : May cause severe irritation.

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

Treat symptomatically.

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : carbon dioxide (CO₂), dry chemical powder, foam. Water.
- Unsuitable extinguishing media : None known.

5.2. Special hazards arising from the substance or mixture

- Fire hazard : Highly flammable. Risk of ignition at all temperatures. Risk of rapid formation of explosive mixtures when combined with air. On combustion forms: Carbon dioxide. Carbon monoxide.
- Explosion hazard : Explosive.
- Reactivity : Possibility of polymerization during production, storage and transportation with rapid liberation of heat and pressure. The reaction may be triggered by high temperatures, rust, or the presence of oxygen and peroxides.

5.3. Advice for firefighters

- Firefighting instructions : Cool closed containers exposed to fire with water spray. Keep upwind.
- Protective equipment for firefighters : Extra personal protection: complete protective clothing including self-contained breathing apparatus. Refer to section 8.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment : Wear suitable protective clothing gloves, and eye/face protection. Refer to section 8.
- Emergency procedures : Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Evacuate unnecessary personnel.

6.1.2. For emergency responders

- Protective equipment : Wear suitable protective clothing, gloves and eye/face protection. Refer to section 8.
- Emergency procedures : Eliminate leaks immediately. Eliminate every possible source of ignition. Ventilate affected area. Use ventilation/water spray/fog to disperse vapours.

6.2. Environmental precautions

Avoid discharge to the environment.

6.3. Methods and material for containment and cleaning up

- For containment : Ventilate affected area.
- Methods for cleaning up : Ventilate affected area.

6.4. Reference to other sections

Refer to sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Use grounded electrical/mechanical equipment. Ground/bond container and receiving equipment. Do not transfer under air or oxygen pressure. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Use only antistatically equipped (spark-free) tools. Provide adequate ventilation. Use explosion-proof electrical/ventilating/lighting/.../ equipment. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
- Storage conditions : Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Keep stored the least quantity possible. Store in dry, cool, well-ventilated area. Keep the cylinders at vertical position, fixed to the wall or other solid structure. Ensure cylinder valve is closed and not leaking. Do not store it in underground level.
- Incompatible materials : Air. Oxygen. Strong oxidizing agents. Copper. Monel alloy, aluminum tetrahydroborate, vinylacetylene, chrome-aldehyde, boron trifluoride, phenol, concentrated solutions of sodium nitrite(5%), halogen.
- Packaging materials : Carbon steel or stainless steel cylinders.

7.3. Specific end use(s)

No additional information available


SECTION 8: Exposure controls/personal protection

8.1. Control parameters

1,3-Butadiene (106-99-0)		
ACGIH	ACGIH TWA (mg/m ³)	4.4 mg/m ³
ACGIH	ACGIH TWA (ppm)	2 ppm

1,3-Butadiene (106-99-0)		
OSHA	OSHA PEL (TWA) (ppm)	1 ppm
OSHA	OSHA PEL (STEL) (ppm)	5 ppm
DNEL	DNEL	2.21 mg/m ³
PNEC	PNEC	not applicable
1,3-butadiene, buta-1,3-diene (106-99-0)		
ACGIH	ACGIH TWA (mg/m ³)	4.4 mg/m ³
ACGIH	ACGIH TWA (ppm)	2 ppm
OSHA	OSHA PEL (TWA) (ppm)	1 ppm
OSHA	OSHA PEL (STEL) (ppm)	5 ppm

8.2. Exposure controls

Appropriate engineering controls	: Provide local exhaust or general room ventilation to minimize vapour concentrations. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure.
Personal protective equipment	: Protective goggles. Protective clothing. Gloves. Self-contained breathing apparatus.
	
Hand protection	: Protective gloves made of PVC. For special purposes, it is recommended to check the resistance to chemicals of the protective gloves mentioned above together with the supplier of these gloves.
Eye protection	: Contact lenses should not be worn. Chemical goggles and/or face shields are required to prevent potential eye contact, irritation or injury.
Skin and body protection	: Wear suitable protective clothing.
Respiratory protection	: Breathing apparatus with high efficiency filter for organic vapours if the concentration is below threshold limit with no oxygen deficiency. Autonomous breathing apparatus if the concentration is above threshold limit or risk of oxygen deficiency.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Gas
Colour	: colourless
Odour	: Mildly aromatic, gasoline like
Odour threshold	: No data available
pH	: Not applicable
Relative evaporation rate	: Not applicable
Melting point	: -108,9 °C at 101,3 (kPa)
Freezing point	: No data available
Boiling point	: -4,41 °C at 101,3 (kPa)
Flash point	: -76 °C
Auto-ignition temperature	: 415 - 420 °C
Decomposition temperature	: No data available
Flammability (solid, gas)	: Flammable
Vapour pressure	: 2,46 atm (248,9 kPa) at 21 °C
Relative vapour density at 20 °C	: 1,87 at 15 °C (air=1)
Relative density	: 0,6452 at 0°C 0,621 at 20°C and 101,3 kPa (water=1)
Solubility	: Water: Slightly soluble Soluble in ethanol, methanol, acetone, diethyl ether, benzene
Log Pow	: No data available
Log Kow	: No data available

Viscosity, kinematic	: No data available
Viscosity, dynamic	: No data available
Explosive properties	: No data available
Oxidising properties	: No data available
Explosive limits	: No data available

9.2. Other information

Molecular Weight: 54,09

SECTION 10: Stability and reactivity

10.1. Reactivity

Possibility of polymerization during production, storage and transportation with rapid liberation of heat and pressure. The reaction may be triggered by high temperatures, rust, or the presence of oxygen and peroxides.

10.2. Chemical stability

This product is stable with an appropriate level of inhibitor, but reactive (unstable) without.

10.3. Possibility of hazardous reactions

Capable of strong chemical reaction at high temperatures and pressures, forming explosive polymers or sensitive to shock and heat.

10.4. Conditions to avoid

Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Avoid static electricity discharges.

10.5. Incompatible materials

Air. Oxygen. Strong oxidizing agents. Copper (Cu). Monel alloy, aluminum tetrahydroborate, vinylacetylene, chrome-aldehyde, boron trifluoride, phenol, concentrated solutions of sodium nitrite(5%), halogen.

10.6. Hazardous decomposition products

Carbon monoxide. Carbon dioxide (CO₂).

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity	: Not classified (Based on available data, the classification criteria are not met)
Skin corrosion/irritation	: Not classified (Based on available data, the classification criteria are not met) pH: Not applicable
Serious eye damage/irritation	: Not classified (Based on available data, the classification criteria are not met) pH: Not applicable
Respiratory or skin sensitisation	: Not classified (Based on available data, the classification criteria are not met)
Germ cell mutagenicity	: May cause genetic defects.
Carcinogenicity	: May cause cancer.
Reproductive toxicity	: Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (single exposure)	: Not classified (Based on available data, the classification criteria are not met)
Specific target organ toxicity (repeated exposure)	: Not classified (Based on available data, the classification criteria are not met)

1,3-Butadiene (106-99-0)

NOAEL (inhalation, rat, gas, 90 days)	1000 ppmv/6h/day
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Aspiration hazard	: Not classified (Based on available data, the classification criteria are not met)
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Symptoms/injuries after inhalation	: May cause irritation to the respiratory tract. irritation of mucous membranes. Asphyxiant in high concentrations. Excessive concentrations may cause nervous system depression, headache, and weakness leading to unconsciousness.
Symptoms/injuries after skin contact	: Repeated exposure may cause skin dryness or cracking. Skin rash/inflammation. Contact with the product may cause cold burns or frostbite.
Symptoms/injuries after eye contact	: May cause severe irritation.

SECTION 12: Ecological information

12.1. Toxicity

1,3-Butadiene (106-99-0)	
ErC50 (algae)	33 mg/l Data obtained by analogy conclusion, e.g. QSAR.

12.2. Persistence and degradability

1,3-Butadiene (106-99-0)	
Persistence and degradability	not persistent.

12.3. Bioaccumulative potential

1,3-Butadiene (106-99-0)	
BCF fish 1	> 2000
Log Pow	1.99

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

Effect on ozone layer	: No additional information available
Effect on the global warming	: No additional information available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Regional legislation (waste)	: Dispose of contents/container to comply with applicable local, national and international regulations. Consult the appropriate authorities about waste disposal.
Waste disposal recommendations	: Dispose of this material and its container at hazardous or special waste collection point.
Additional information	: Non-recyclable empty containers must be destroyed and forwarded to re-melting in authorized installations.

SECTION 14: Transport information

Classification for LAND transport: DOT

UN Number	: UN1010
Proper Shipping Name	: Butadienes, stabilized
Class	: 2.1
Packing group	: Not applicable
Reportable quantity	: Not applicable

Classification for SEA transport: IMO - IMDG

UN Number	: UN1010
Proper Shipping Name	: BUTADIENES, STABILIZED
Class	: 2.1
Packing group	: Not applicable
Marine pollutant	: Not considered marine pollutant based on available data
Transport in bulk according to Annex II of MARPOL 73/78 and the IGC Code :	
Product name	: Butadiene

Classification for AIR transport: IATA - ICAO

UN Number	: UN1010
Proper Shipping Name	: Butadienes, stabilized
Class	: 2.1
Packing group	: Not applicable

This information does not intend to convey all specific regulatory or operational requirements/information relating to the product therefore it cannot be considered exhaustive. Consult US DOT, IMO and ICAO regulations before transporting the product. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

SECTION 15: Regulatory information

15.1. US Federal regulations

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

RQ (Reportable quantity, section 304 of EPA's List of Lists)	10 lb
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15.2. International regulations

CANADA

No additional information available

EU-Regulations

1,3-Butadiene (106-99-0)

Listed on the EEC inventory EINECS (European Inventory of Existing Commercial Chemical Substances)

Classification according to Regulation (EC) No. 1272/2008 [CLP]

No additional information available

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

No additional information available

15.2.2. National regulations

No additional information available

15.3. US State regulations

No additional information available

SECTION 16: Other information

Sources of Key data	: SDS - Safety Data Sheet.
Abbreviations and acronyms	: ACGIH (American Conference of Government Industrial Hygienists). ASTM - American Society for Testing and Materials . CAS (Chemical Abstracts Service) number. CLP - Classification, Labelling and Packaging. EEC - European Economic Community. EC - European Community. CSR - Chemical Safety Report. GHS - Globally Harmonised System. IARC (International Agency for Research on Cancer). Overland transport (ADR). PVC (Polyvinyl chloride). REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals. SDS - Safety Data Sheet.

Full text of H-statements:

-----	Carc. 1A	Carcinogenicity, Category 1A
-----	Compressed gas	Gases under pressure : Compressed gas
-----	Flam. Gas 1	Flammable gases, Category 1
-----	Muta. 1B	Germ cell mutagenicity, Category 1B
-----	H220	Extremely flammable gas
-----	H280	Contains gas under pressure; may explode if heated
-----	H340	May cause genetic defects
-----	H350	May cause cancer



Safety Data Sheet

According to the federal final rule of hazard communication revised on 2012 (HazCom 2012)

Product: 1,3-Butadiene

Date of revision: 17/Jan/2018 Version: 3.2

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. It warns that the handling of any chemical substance requires the previous knowledge of its hazards for the user. It is up to the user of the product company providing this SDS to and promote the training of its employees about possible risks come upon of the product. The information contained herein is not absolute, but only general information on the use of the chemical and indication of safety and security measures.