

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

1.1. Product identifier

Product form	: Substance
Trade name	: Butene-1
IUPAC name	: but-1-ene
CAS No	: 106-98-9
Formula	: C4C8
Synonyms	: 1-Butylene; Ethylethylene; Butenos

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

Use of the substance/mixture	: Load in aromatic gas area and the final area product 04 - butene 1
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1.3. Details of the supplier of the safety data sheet

US office:
 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.
 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

Simple Asphy	H380
Flam. Gas 1	H220
Liquefied gas	H280

Full text of H-statements: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US)	:	 
		GHS02 GHS04

Signal word (GHS-US)	: Danger
Hazard statements (GHS-US)	: H220 - Extremely flammable gas H280 - Contains gas under pressure; may explode if heated H380 - May displace oxygen and cause rapid suffocation
Precautionary statements (GHS-US)	: P210 - Keep away from heat, hot surfaces, open flames, sparks. - No smoking 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 P410+P403 - Protect from sunlight. Store in a well-ventilated place

2.3. Other hazards

other hazards which do not result in classification : When mixed with air and exposed to ignition source, can burn in open air or explode if confined. Can cause frostbite.

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Substance type : Multi-constituent
 Name : Butene-1
 CAS No : 106-98-9

Name	Product identifier	%	GHS-US classification
2-methylpropene (Impurity)	(CAS No) 115-11-7	0,2	Simple Asphy, H380 Flam. Gas 1, H220
Butene (Impurity)	(CAS No) 25167-67-3	0,15	Simple Asphy, H380 Flam. Gas 1, H220
isobutane (Impurity)	(CAS No) 75-28-5	0,1	Simple Asphy, H380 Flam. Gas 1, H220

Full text of H-statements: see section 16

3.2. Mixture

Not applicable

4.1. Description of first aid measures

First-aid measures general : No direct artificial respiration to be given by first aider. Do not rub the skin and eyes after direct contact with the product.

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. If breathing is difficult, give oxygen. Seek medical attention immediately.

First-aid measures after skin contact : Can cause frostbite. Remove the victim away from contaminated area. Remove clothing and jewellery that can restrict circulation. Rinse immediately with plenty of water for 15 minutes. Seek medical attention immediately.

First-aid measures after eye contact : Can cause frostbite. Rinse immediately and thoroughly, pulling the eyelids well away from the eye (15 minutes minimum). Remove contact lenses, if present and easy to do. Continue rinsing. Seek medical attention immediately.

First-aid measures after ingestion : not applicable.

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

Symptoms/injuries after inhalation : Asphyxiant in high concentrations. Dizziness. Heart attack/cardiac arrest. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness. Death.

Symptoms/injuries after skin contact : Can cause frostbite.

Symptoms/injuries after eye contact : Can cause frostbite.

Symptoms/injuries after ingestion : not applicable.

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

Symptomatic treatment should include, above all, measured of support as correction of hydro electrolytic and metabolic disturbances and respiratory failure.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media : carbon dioxide (CO₂), dry chemical powder, foam. For large fire : Use water spray/fog for cooling.

Unsuitable extinguishing media : Do not use water jet. Do not extinguish flame due to possibility of explosive reignition. Do not aim water directly at point where compressed gas is escaping, as the water may freeze.

5.2. Special hazards arising from the substance or mixture

- Fire hazard : Extremely flammable gas. Explosive when mixed with oxidizing substances. Vapours can travel considerable distances to a source of ignition where they can ignite, flash back, or explode. Fight fire with normal precautions from a reasonable distance. Prolonged exposure to fire may cause containers to rupture/explode. Heavier than air, vapours may travel long distances along ground, ignite and flash back to source. Can cause frostbite. Asphyxiant in high concentrations. Hazardous combustion products. On combustion forms: Carbon dioxide. Carbon monoxide.
- Explosion hazard : May form flammable/explosive vapour-air mixture. In closed containers, pressure build up could result in distortion, blowing and in extreme cases bursting of the container.

5.3. Advice for firefighters

- Firefighting instructions : Cool closed containers exposed to fire with water spray.
- Protective equipment for firefighters : In case of fire: Wear self-contained breathing apparatus. Full protective flameproof clothing.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment : Use personal protective equipment as required. Refer to section 8.
- Emergency procedures : Eliminate ignition sources. No smoking. Evacuate and limit access.

6.1.2. For emergency responders

- Protective equipment : Complete protective clothing. Self contained breathing apparatus. Refer to section 8.
- Emergency procedures : Eliminate ignition sources. No smoking. Evacuate and limit access.

6.2. Environmental precautions

Avoid release to the environment. Use water spray jet to minimise or disperse vapours.

6.3. Methods and material for containment and cleaning up

- For containment : Stop leak if safe to do so. May be vented to atmosphere. Ventilate affected area.
- Methods for cleaning up : May be vented to atmosphere. Ventilate affected area.

6.4. Reference to other sections

No additional information available

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Avoid contact with skin, eyes and clothes. Avoid inhalation of product. Wear recommended personal protective equipment. If leak continues, evacuate area and avoiding sources of ignition and minimising personal risk, move the leaking cylinder to a safe outside area. Handle in accordance with good industrial hygiene and safety procedures.

7.2. Conditions for safe storage, including any incompatibilities

- Technical measures : Proper grounding procedures to avoid static electricity should be followed. Keep away from open flames, hot surfaces and sources of ignition. Use explosion-proof electrical equipment. Use only antistatically equipped (spark-free) tools. Keep fire-fighting equipment nearby.
- Storage conditions : Store in dry, cool, well-ventilated area. Avoid ignition sources.
- Incompatible products : Oxidizing agent. Chlorates. Perchlorates. Nitrates. Peroxides. Permanganates. Aluminium tris-tetrahydroborate.
- Storage area : Store in dry, cool, well-ventilated area. Keep away from sources of ignition. Keep the container tightly closed. Provide earthing of containers, equipment, pumps and ventilation facilities. Ensure cylinder valve is closed and not leaking. Containers which are opened should be properly resealed and kept upright to prevent leakage. Correctly labelled.
- Packaging materials : Carbon steel. stainless steel. Cylinders. This material may attack some forms of plastics, rubbers and coatings.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

1-Butene (106-98-9)		
ACGIH	ACGIH TWA (ppm)	250 ppm
isobutane (75-28-5)		
ACGIH	ACGIH TWA (ppm)	1000 ppm
Butene (25167-67-3)		
ACGIH	ACGIH TWA (ppm)	250 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 : Safety glasses. Gloves. Protective clothing. If excessive exposure exists, use only approved air-purifying or supplied air respirator operated in a positive pressure mode.
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- Materials for protective clothing : PVC (Polyvinyl chloride).
- Hand protection : Protective gloves made of PVC.
- Eye protection : Safety glasses with side shields. Contact lenses should not be worn.
- Skin and body protection : Boots made of PVC. PVC apron covering the tops of the boots.
- Respiratory protection : An approved organic vapour respirator/supplied air or self-contained breathing apparatus must be used when vapour concentration exceeds applicable exposure limits.
- Environmental exposure controls : Avoid release to the environment. Do not allow into drains or water courses. Use water spray jet to minimise or disperse vapours.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

- Physical state : Gas
- Molecular mass : 56 g/mol
- Colour : colourless
- Odour : gasolinen-like
- Odour threshold : No data available
- pH : Not applicable
- Relative evaporation rate (butyl acetate=1) : No data available
- Melting point : -185,3 °C
- Freezing point : No data available
- Boiling point : -6,47 °C
- Flash point : -80 °C (estimated)
- Auto-ignition temperature : 385 °C
- Decomposition temperature : Not available

Flammability (solid, gas)	: Flammable
Vapour pressure	: 2,253 x 10 ³ mmHg at 25°C
Relative vapour density at 20 °C	: 1,93 (air=1)
Relative density	: No data available
Solubility	: Insoluble in water. Soluble in benzene, ether and ethanol.
Log Pow	: 2,4
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	: 1,6 - 10 vol %

9.2. Other information

Gas group : Liquefied gas

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

The product is stable at normal handling and storage conditions.

10.3. Possibility of hazardous reactions

Danger of explosion on contact with : Oxygen. No polymerization.

10.4. Conditions to avoid

No flames, no sparks. Eliminate all sources of ignition. Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

10.5. Incompatible materials

Oxygen. Strong oxidizing agents. Aluminium tris-tetrahydroborate.

10.6. Hazardous decomposition products

During a fire: 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)

Butene (25167-67-3)	
LC50 inhalation rat (mg/l)	658 mg/l/4h
ATE US (vapours)	658,000 mg/l/4h
ATE US (dust,mist)	658,000 mg/l/4h

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	:	Not classified (Based on available data, the classification criteria are not met)
Carcinogenicity	:	Not classified (Based on available data, the classification criteria are not met)
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)
Aspiration hazard	:	Not classified (Based on available data, the classification criteria are not met)
Potential Adverse human health effects and symptoms	:	Asphyxia by lack of oxygen: risk of death. Central nervous system depression. Fatigue, euphoria, headache, excitation, disorientation, drowsiness, anesthesia, insomnia, mental confusion and convulsions. . Can cause frostbite.
Symptoms/injuries after inhalation	:	Asphyxiant in high concentrations. Dizziness. Heart attack/cardiac arrest. Symptoms include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness. Death.
Symptoms/injuries after skin contact	:	Can cause frostbite.
Symptoms/injuries after eye contact	:	Can cause frostbite.
Symptoms/injuries after ingestion	:	not applicable.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - air	:	Contributes to the formation of photochemical smog by degradation in the atmosphere through photochemical reactions to form photochemical oxidants and interfering with the photochemical cycle of nitrogen oxides.
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12.2. Persistence and degradability

1-Butene (106-98-9)

Persistence and degradability	Rapidly degradable.
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12.3. Bioaccumulative potential

1-Butene (106-98-9)

Log Pow	2,4
Bioaccumulative potential	Low bioaccumulation potential.

Butene (25167-67-3)

Log Pow	<= 2,8
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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

Waste treatment methods : Can be deposited in landfills, sent to an incineration or other appropriate means of disposal provided they meet the requirements of local laws. Keep the product residues in their original containers and properly sealed inside metallic drums according to legislation.

SECTION 14: Transport information

Classification for LAND transport: DOT

UN Number : UN1012
 Proper Shipping Name : Butylene
 Class/Division : 2.1
 Packing group : Not applicable
 Reportable quantity : Not applicable

Classification for SEA transport: IMO - IMDG

UN Number : UN1012
 Proper Shipping name : BUTYLENE
 Class/Division : 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 : Butylenes

Classification for AIR transport: IATA - ICAO

UN Number : UN1012
 Proper Shipping Name : Butylene
 Class/Division : 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

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory except for:

2-methylpropene	CAS No 115-11-7	0,20%
isobutane	CAS No 75-28-5	0,10%

15.2. International regulations

CANADA

No additional information available

Butene (25167-67-3)

Listed on the Canadian DSL (Domestic Substances List)

EU-Regulations

No additional information available

Butene (25167-67-3)

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

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

Flam. Gas 1 H220
Compressed gas H280

Full text of H-statements: see section 16

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

F+; R12

Full text of R-phrases: see section 16

15.2.2. National regulations

Butene (25167-67-3)

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 Korean ECL (Existing Chemicals List)
Listed on NZIoC (New Zealand Inventory of Chemicals)
Listed on PICCS (Philippines Inventory of Chemicals and Chemical Substances)

15.3. US State regulations

No additional information available

SECTION 16: Other information

Full text of H-statements:

-----	Flam. Gas 1	Flammable gases, Category 1
-----	Liquefied gas	Gases under pressure : Liquefied gas
-----	Simple Asphy	Simple Asphyxiant
-----	H220	Extremely flammable gas
-----	H280	Contains gas under pressure; may explode if heated
-----	H380	May displace oxygen and cause rapid suffocation

Braskem - SDS US

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.