

**Butene 1-****017****SECTION 1. Identification of the substance/mixture and of the company/undertaking****1.1. Product identifier**

Trade name	: Butene 1-
SDS no	: 017
Chemical description	: Butene 1- CAS No :106-98-9 EC No :203-449-2 Index No :601-012-00-4
Registration-No.	: 01-2119456615-34 -
Chemical formula	: C4H8

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

Relevant identified uses	: Industrial and professional. Perform risk assessment prior to use. Test gas / Calibration gas. Chemical reaction / Synthesis. Laboratory use. Contact supplier for more uses information.
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**1.3. Details of the supplier of the safety data sheet**

Company identification	: AIR LIQUIDE Deutschland GmbH Hans-Günther-Sohl-Straße 5 D-40235 Düsseldorf GERMANY Telefon: +49 (0)211 6699-0 - Fax: +49 (0)211 6699-222
E-Mail address (competent person)	: Info.SDB@AirLiquide.de

**1.4. Emergency telephone number**

Emergency telephone number	: +49 (0)2151 398668
- Availability	: ( 24 / 7 )

**SECTION 2. Hazards identification****2.1. Classification of the substance or mixture****Hazard Class and Category Code(s), Regulation (EC) No 1272/2008 (CLP)**

• Physical hazards	: Flammable gases - Category 1 - Danger - (CLP : Flam. Gas 1) - H220 Gases under pressure - Liquefied gas - Warning - (CLP : Press. Gas) - H280
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**2.2. Label elements****Labelling Regulation EC 1272/2008 (CLP)**

- Hazard pictograms



• Hazard pictograms code	: GHS02 - GHS04
• Signal words	: Danger
• Hazard statements	: H220 - Extremely flammable gas. H280 - Contains gas under pressure; may explode if heated.
• Precautionary statements	
- Prevention	: P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- Response	: P377 - Leaking gas fire: Do not extinguish, unless leak can be stopped safely. P381 - Eliminate all ignition sources if safe to do so.
- Storage	: P403 - Store in a well-ventilated place.



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## SECTION 2. Hazards identification (continued)

### 2.3. Other hazards

Other hazards : None.

## SECTION 3. Composition/information on ingredients

### 3.1. Substance / 3.2. Mixture

Substance.

Substance name	Content [Vol-%]	CAS No EC No Index No Registration no.	Classification(DSD)	Classification(CLP)
Butene 1-	: 100 %	106-98-9 203-449-2 601-012-00-4 01-2119456615-34 -		Flam. Gas 1 (H220) Liq. Gas (H280)

Contains no other components or impurities which will influence the classification of the product.

\* 1: Listed in Annex IV / V REACH, exempted from registration.

\* 2: Registration deadline not expired.

\* 3: Registration not required: Substance manufactured or imported &lt; 1t/y

Full text of R-phrases see chapter 16. Full text of H-statements see chapter 16

## SECTION 4. First aid measures

### 4.1. Description of first aid measures

- Inhalation : Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
- Skin contact : For liquid spillage - flush with water for at least 15 minutes.
- Eye contact : For liquid spillage - flush with water for at least 15 minutes.
- Ingestion : Ingestion is not considered a potential route of exposure.

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

- : In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/ consciousness. Victim may not be aware of asphyxiation.  
In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.

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

- : None.



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## SECTION 5. Fire-fighting measures

### 5.1. Extinguishing media

- Suitable extinguishing media : Dry powder.  
Water spray or fog.
- Unsuitable extinguishing media : Carbon dioxide.  
Do not use water jet to extinguish.

### 5.2. Special hazards arising from the substance or mixture

- Specific hazards : Exposure to fire may cause containers to rupture/explode.
- Hazardous combustion products : Incomplete combustion may form carbon monoxide.

### 5.3. Advice for firefighters

- Specific methods : Move containers away from the fire area if this can be done without risk.  
Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.  
If possible, stop flow of product.  
Use fire control measures appropriate to the surrounding fire. Exposure to fire and heat radiation may cause gas receptacles to rupture. Cool endangered receptacles with water spray jet from a protected position. Prevent water used in emergency cases from entering sewers and drainage systems.  
Use water spray or fog to knock down fire fumes if possible.
- Special protective equipment for fire fighters : In confined space use self-contained breathing apparatus.  
Standard EN 137 - Self-contained open-circuit compressed air breathing apparatus with full face mask.  
Standard EN 469 - Protective clothing for firefighters. Standard - EN 659: Protective gloves for firefighters.

## SECTION 6. Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

- : Act in accordance with local emergency plan.  
Stay upwind.  
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.  
Ensure adequate air ventilation.  
Eliminate ignition sources.  
Evacuate area.  
Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.  
Try to stop release.  
Consider the risk of potentially explosive atmospheres.

### 6.2. Environmental precautions

- : Try to stop release.

### 6.3. Methods and material for containment and cleaning up

- : Ventilate area.

### 6.4. Reference to other sections

- 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

#### Safe use of the product

- : Do not breathe gas.
- Avoid release of product into atmosphere.
- Take precautionary measures against static discharge.
- Keep away from ignition sources (including static discharges).
- Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.
- Purge air from system before introducing gas.
- Do not smoke while handling product.
- Avoid suck back of water, acid and alkalis.
- Only experienced and properly instructed persons should handle gases under pressure.
- Ensure the complete gas system was (or is regularly) checked for leaks before use.
- Assess the risk of potentially explosive atmosphere and the need for explosion-proof equipment.
- Consider the use only non-sparking tools.
- The product must be handled in accordance with good industrial hygiene and safety procedures.
- Consider pressure relief device(s) in gas installations.

#### Safe handling of the gas receptacle

- : Refer to supplier's container handling instructions.
- Do not allow backfeed into the container.
- Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment.
- Protect cylinders from physical damage; do not drag, roll, slide or drop.
- Do not remove or deface labels provided by the supplier for the identification of the cylinder contents.
- When moving cylinders, even for short distances, use a cart (trolley, hand truck, etc.) designed to transport cylinders.
- Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use.
- If user experiences any difficulty operating cylinder valve discontinue use and contact supplier.
- Close container valve after each use and when empty, even if still connected to equipment.
- Never attempt to repair or modify container valves or safety relief devices.
- Keep container valve outlets clean and free from contaminants particularly oil and water.
- Never attempt to transfer gases from one cylinder/container to another.
- Never use direct flame or electrical heating devices to raise the pressure of a container.
- Damaged valves should be reported immediately to the supplier.

### 7.2. Conditions for safe storage, including any incompatibilities

- : Keep container below 50°C in a well ventilated place.
- Segregate from oxidant gases and other oxidants in store. Store containers in location free from fire risk and away from sources of heat and ignition. Stored containers should be periodically checked for general condition and leakage.
- Observe all regulations and local requirements regarding storage of containers.
- Containers should not be stored in conditions likely to encourage corrosion. Containers should be stored in the vertical position and properly secured to prevent toppling. Container valve guards or caps should be in place. All electrical equipment in the storage areas should be compatible with the risk of potentially explosive atmosphere. Keep away from combustible materials.

### 7.3. Specific end use(s)

- : None.

**Butene 1-****017****SECTION 8. Exposure controls/personal protection****8.1. Control parameters**

**DNEL: Derived no effect level (Workers)**

**Butene 1-** : Inhalation-long term (local) [mg/m<sup>3</sup>] : 1530  
: Inhalation-long term (systemic) [mg/m<sup>3</sup>] : 769

**PNEC: Predicted no effect concentration**

: No data available.

**8.2. Exposure controls**

**8.2.1. Appropriate engineering controls**

: Provide adequate general and local exhaust ventilation. Systems under pressure should be regularly checked for leakages. Ensure exposure is below occupational exposure limits (where available). Gas detectors should be used when flammable gases/vapours may be released. The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required. For tasks where the intervention of workers is required, the substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities.

**8.2.2. Individual protection measures, e.g. personal protective equipment**

: A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. PPE compliant to the recommended EN/ISO standards should be selected.

• **Eye/face protection**

: Wear safety glasses with side shields or goggles when transfilling or breaking transfer connections  
Wear safety glasses with side shields  
Standard EN 166 - Personal eye-protection.

• **Skin protection**

- **Hand protection**

: Wear working gloves when handling gas containers.  
Standard EN 388 - Protective gloves against mechanical risk.  
Consult glove manufacturer's product information on material suitability and material thickness.  
The breakthrough time of the selected gloves must be greater than the intended use period.  
Fluoroelastomer (FKM) /

- **Other**

: Consider the use of flame resistant anti-static safety clothing.  
Standard EN ISO 14116 - Limited flame spread materials.  
Standard EN ISO 1149-5 - Protective clothing: Electrostatic properties.  
Wear safety shoes while handling containers.  
Standard EN ISO 20345 - Personal protective equipment - Safety footwear.

• **Respiratory protection**

: Gas filters do not protect against oxygen deficiency.  
Gas filters may be used if all surrounding conditions e.g. type and concentration of the contaminant(s) and duration of use are known.  
Standard EN 14387 - Gas filter(s), combined filter(s) and full face mask - EN 136.  
Consult respiratory device supplier's product information for the selection of the appropriate device.  
Recommended: Filter AX (brown).

• **Thermal hazards**

: None necessary.

**8.2.3. Environmental exposure controls**

: Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

**Butene 1-****017****SECTION 9. Physical and chemical properties****9.1. Information on basic physical and chemical properties**

Appearance	
Physical state at 20°C / 101.3kPa	: Gas.
Colour	: Colourless.
Odour	: Sweetish. Poor warning properties at low concentrations.
Odour threshold	: Odour threshold is subjective and inadequate to warn for overexposure.
pH value	: Not applicable.
Molar mass [g/mol]	: 56
Melting point [°C]	: -185
Boiling point [°C]	: -6.2
Critical temperature [°C]	: 146
Flash point [°C]	: Not applicable for gases and gas-mixtures.
Evaporation rate (ether=1)	: Not applicable for gases and gas-mixtures.
Flammability range [vol% in air]	: 1.2 to 10.6
Vapour pressure [20°C]	: 2.6 bar
Relative density, gas (air=1)	: 2
Relative density, liquid (water=1)	: 0.63
Solubility in water [mg/l]	: No reliable data available.
Partition coefficient n-octanol/water [log Pow]	: 2.4
Auto-ignition temperature [°C]	: 440
Viscosity at 20°C [mPa.s]	: Not applicable.
Explosive Properties	: Not applicable.
Oxidising properties	: None.

**9.2. Other information**

Other data	: Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.
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**SECTION 10. Stability and reactivity****10.1. Reactivity**

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

**10.2. Chemical stability**

: Stable under normal conditions.

**10.3. Possibility of hazardous reactions**: Can form explosive mixture with air.  
May react violently with oxidants.**10.4. Conditions to avoid**

: Keep away from heat/sparks/open flames/hot surfaces. – No smoking.

**10.5. Incompatible materials**: Air, Oxidiser.  
For additional information on compatibility refer to ISO 11114**10.6. Hazardous decomposition products**

: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

**Butene 1-****017****SECTION 10. Stability and reactivity (continued)****SECTION 11. Toxicological information****11.1. Information on toxicological effects**

Acute toxicity	: No known toxicological effects from this product.
Skin corrosion/irritation	: No known effects from this product.
Serious eye damage/irritation	: No known effects from this product.
Respiratory or skin sensitisation	: No known effects from this product.
Carcinogenicity	: No known effects from this product.
Germ cell mutagenicity	: No known effects from this product.
Reproductive toxicity	: No known effects from this product.
STOT-single exposure	: No known effects from this product.
STOT-repeated exposure	: No known effects from this product.
Aspiration hazard	: Not applicable for gases and gas-mixtures.

**SECTION 12. Ecological information****12.1. Toxicity**

Assessment	
EC50 48h - Daphnia magna [mg/l]	: 11
EC50 72h - Algae [mg/l]	: 6.5
LC50-96h - fish [mg/l]	: 19

**12.2. Persistence and degradability**

Assessment	: Not readily biodegradable.
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**12.3. Bioaccumulative potential**

Assessment	: Not expected to bioaccumulate due to the low log Kow (log Kow < 4). Refer to section 9.
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**12.4. Mobility in soil**

Assessment	: Because of its high volatility, the product is unlikely to cause ground or water pollution.
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**12.5. Results of PBT and vPvB assessment**

: Not classified as PBT or vPvB.

**12.6. Other adverse effects**

Effect on ozone layer	: None.
Effect on the global warming	: No known effects from this product.

**Butene 1-****017****SECTION 13. Disposal considerations****13.1. Waste treatment methods**

: Do not discharge into areas where there is a risk of forming an explosive mixture with air.  
Waste gas should be flared through a suitable burner with flash back arrestor.  
Do not discharge into any place where its accumulation could be dangerous.  
Refer to the code of practice of EIGA (Doc. 30/10 "Disposal of Gases, downloadable at <http://www.eiga.org>) for more guidance on suitable disposal methods  
Ensure that the emission levels from local regulations or operating permits are not exceeded.

List of hazardous waste codes (from Commission Decision 2001/118/EC) : 16 05 04: Gases in pressure containers (including halons) containing dangerous substances.

**13.2. Additional information**

: None.

**SECTION 14. Transport information****14.1. UN number**

UN number : 1012  
Labelling ADR, IMDG, IATA



: 2.1 : flammable gas.

**14.2. UN proper shipping name**

Transport by road/rail (ADR/RID) : BUTYLENE  
Transport by air (ICAO-TI / IATA-DGR) : BUTYLENE  
Transport by sea (IMDG) : BUTYLENE

**14.3. Transport hazard class(es)**

Transport by road/rail (ADR/RID)  
Class : 2  
Classification code : 2 F  
H.I. nr : 23  
Tunnel Restriction : B/D Tank carriage: Passage forbidden through tunnels of category B, C, D  
Transport by air (ICAO-TI / IATA-DGR)  
Transport by sea (IMDG)  
Emergency Schedule (EmS) - Fire : F-D  
Emergency Schedule (EmS) - Spillage : S-U

**14.4. Packing group**

Transport by road/rail (ADR/RID) : Not applicable.  
Transport by air (ICAO-TI / IATA-DGR) : Not applicable.  
Transport by sea (IMDG) : Not applicable.

**14.5. Environmental hazards**

Transport by road/rail (ADR/RID) : None.  
Transport by air (ICAO-TI / IATA-DGR) : None.  
Transport by sea (IMDG) : No





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## SECTION 14. Transport information (continued)

### 14.6 Special precautions for user

Packing Instruction(s)

Transport by road/rail (ADR/RID) : P200

Transport by air (ICAO-TI / IATA-DGR)

Passenger and Cargo Aircraft : DO NOT LOAD IN PASSENGER AIRCRAFT.

Cargo Aircraft only : Allowed.

Packing instruction - Cargo Aircraft only : 200

Transport by sea (IMDG) : P200

Special precautions for user : - Ensure there is adequate ventilation.  
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 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.  
Avoid transport on vehicles where the load space is not separated from the driver's compartment.

### 14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not applicable.

## SECTION 15. Regulatory information

### 15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

#### EU legislation

Restrictions on use : None.

Seveso directive 96/82/EC : Listed.

#### National legislation

: Ensure all national/local regulations are observed.

: [German regulations]

BetriebssicherheitsV mit TRBSen insbesondere TRBS 3145 / TRGS 725 "Ortsbewegliche Druckgasbehälter", TRGS 2141, BGR Regel 500 Teil 2.33: "Umgang mit Gasen", GefahrstoffV mit Technischen Regeln Gefährliche Stoffe TRGS insbesondere TRGS 407 "Tätigkeiten mit Gasen - Gefährdungsbeurteilung", TRGS 400, 500, 510, 900.  
BGR 104, TRBS 2152.

- 4. BlmschV (Germany) : Listed.

- Water hazard class (WGK) : WGK Germany: Not hazardous to waters.

### 15.2. Chemical safety assessment

: A Chemical safety assessment (CSA) has been carried out for this product.  
Refer to section 8.2.



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**SECTION 16. Other information**

- Indication of changes** : Revised safety data sheet in accordance with commission regulation (EU) No 453/2010
- Training advice** : The hazard of asphyxiation is often overlooked and must be stressed during operator training. Ensure operators understand the flammability hazard.
- Further information** : This Safety Data Sheet has been established in accordance with the applicable European Union legislation.
- List of full text of H-statements in section 3.** : H220 - Extremely flammable gas.  
H280 - Contains gas under pressure; may explode if heated.
- DISCLAIMER OF LIABILITY** : Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out. Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

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