

Material Safety Data Sheet



Flammable Gas Mixture: 1 Butene / Cis-2-Butene / Ethane / Ethylene / Hydrogen / Methane / N Butane / N Pentane / Nitrogen / Trans-2-Butene

Section 1. Chemical product and company identification

Product Name : Flammable Gas Mixture: 1 Butene / Cis-2-Butene / Ethane / Ethylene / Hydrogen / Methane / N Butane / N Pentane / Nitrogen / Trans-2-Butene

Supplier : AIRGAS INC., on behalf of its subsidiaries
259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283
1-610-687-5253

Product use : Synthetic/Analytical chemistry.

Synonym :

MSDS# : 002083

Date of Preparation/Revision : **12/24/2007.**

In case of emergency : 1-866-734-3438

Section 2. Hazards identification

Physical state : Gas.

Emergency overview : Warning!
FLAMMABLE GAS.
CONTENTS UNDER PRESSURE.
HARMFUL IF SWALLOWED.
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS:
LUNGS, HEART, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE,
LENS OR CORNEA, MUSCLE TISSUE.
VAPOR MAY CAUSE FLASH FIRE.
POSSIBLE CANCER HAZARD
CONTAINS MATERIAL WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA.
Do not ingest. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Risk of cancer depends on duration and level of exposure.
Contact with rapidly expanding gases can cause frostbite.

Routes of entry : Inhalation

Potential acute health effects

Eyes : Irritating to eyes.

Skin : Irritating to skin.

Inhalation : Acts as a simple asphyxiant.

Ingestion : Ingestion is not a normal route of exposure for gases

Potential chronic health effects : **CARCINOGENIC EFFECTS** Classified A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC [Ethylene].
MUTAGENIC EFFECTS Not available.
TERATOGENIC EFFECTS: Not available.

Medical conditions aggravated by overexposure : Acute or chronic respiratory conditions may be aggravated by overexposure to this gas.

See toxicological Information (section 11)

Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Ethylene	74-85-1	6.1 - 99	ACGIH TLV (United States, 1/2005). Notes: ACGIH 2005 Adoption Refers to Appendix A -- Carcinogens. TWA: 200 ppm 8 hour(s). Form: All forms
Hydrogen	1333-74-0	1 - 99	ACGIH TLV (United States, 1/2004). Notes: ACGIH 2004 Adoption TWA: 1000 ppm 8 hour(s). Form: All forms
Nitrogen	7727-37-9	1 - 91.5	
Ethane	74-84-0	0.1 - 91.5	
1-Butene	106-98-9	1 - 50	ACGIH TLV (United States, 1/2004). Notes: ACGIH 2004 Adoption TWA: 1000 ppm 8 hour(s). Form: All forms
Methane	74-82-8	0.1 - 50	
trans-2-butene	624-64-6	0.1 - 5	ACGIH TLV (United States, 1/2004). Notes: ACGIH 2004 Adoption TWA: 1000 ppm 8 hour(s). Form: All forms NIOSH REL (United States, 6/2001). TWA: 1900 mg/m ³ 10 hour(s). Form: All forms TWA: 800 ppm 10 hour(s). Form: All forms
n-Butane	106-97-8	0.08 - 5	
Pentane	109-66-0	0.06 - 5	
			ACGIH TLV (United States, 9/2004). Notes: 1998 Adoption. TWA: 600 ppm 8 hour(s). Form: All forms NIOSH REL (United States, 6/2001). CEIL: 1800 mg/m ³ 15 minute(s). Form: All forms CEIL: 610 ppm 15 minute(s). Form: All forms TWA: 350 mg/m ³ 10 hour(s). Form: All forms TWA: 120 ppm 10 hour(s). Form: All forms OSHA PEL (United States, 6/1993). TWA: 2950 mg/m ³ 8 hour(s). Form: All forms TWA: 1000 ppm 8 hour(s). Form: All forms
cis-2-Butene	590-18-1	0.1 - 5	

Section 4. First aid measures

No action shall be taken involving any personal risk or without suitable training. If fumes are still suspected to be present, the rescuer should wear an appropriate mask or a self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

- Eye contact** : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.
- Skin contact** : In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : If inhaled, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.
- Ingestion** : Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

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Section 5. Fire fighting measures

- Flammability of the product** : Flammable.
- Auto-ignition temperature** : The lowest known value is 286.85°C (548.3°F) (Butane).
- Flash point** : The lowest known value is Closed cup: -188.15°C (-306.7°F). (Methane)
- Flammable limits** : The greatest known range is Lower: 4% Upper: 75% (Hydrogen)
- Products of combustion** : These products are carbon oxides (CO, CO₂), nitrogen oxides (NO, NO₂...).
- Fire hazards in presence of various substances** : Extremely flammable in presence of open flames, sparks and static discharge.
- Fire fighting media and instructions** : In case of fire, use water spray (fog), foam, dry chemicals, or CO₂.

If involved in fire, shut off flow immediately if it can be done without risk. Apply water from a safe distance to cool container and protect surrounding area.

Extremely flammable. Gas may accumulate in confined areas, travel considerable distance to source of ignition and flash back causing fire or explosion.

- Special protective equipment for fire-fighters** : Fire fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full facepiece operated in positive pressure mode.

Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (Section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 7. Handling and storage

- Handling** : Do not ingest. Keep container closed. Use only with adequate ventilation. Keep away from heat, sparks and flame. To avoid fire, minimize ignition sources. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Do not puncture or incinerate container. Wash thoroughly after handling. High pressure gas. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : Keep container tightly closed. Keep container in a cool, well-ventilated area. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

Section 8. Exposure Controls, Personal Protection

- Engineering controls** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. The engineering controls also need to keep gas, vapor or dust concentrations below any explosive limits. Use explosion-proof ventilation equipment.

Personal protection

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

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Hands : Chemical-resistant, impervious gloves or gauntlets complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Personal protection in case of a large spill : A self-contained breathing apparatus should be used to avoid inhalation of the product.

Consult local authorities for acceptable exposure limits.

Section 9. Physical and chemical properties

Molecular weight : Not applicable.

Molecular formula : Not applicable.

Boiling/condensation point : Not available.

Melting/freezing point : -105.05°C (-157.1°F) based on data for: (e)-but-2-ene. Weighted average: -196.87°C (-322.4°F)

Critical temperature : The lowest known value is -240.1°C (-400.2°F) (Hydrogen).

Vapor density : The highest known value is 2 (Air = 1) (Butane). Weighted average: 0.9 (Air = 1)

Specific Volume (ft³/lb) : Not applicable.

Gas Density (lb/ft³) : Weighted average: 0.02

Section 10. Stability and reactivity

Stability and reactivity : The product is stable.

Incompatibility with various substances : Highly reactive with oxidizing agents.

Section 11. Toxicological information

<u>Ingredient name</u>	<u>Test</u>	<u>Result</u>	<u>Route</u>	<u>Species</u>
Pentane	LD50	400 mg/kg	Oral	Rat

Chronic effects on humans : **CARCINOGENIC EFFECTS** Classified A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC [Ethylene]. Contains material which causes damage to the following organs: lungs, heart, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea, muscle tissue.

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material for humans.

Specific effects

Carcinogenic effects : Contains material which may cause cancer based on animal data. Risk of cancer depends on duration and level of exposure.

Mutagenic effects : No known significant effects or critical hazards.

Reproduction toxicity : No known significant effects or critical hazards.

Section 12. Ecological information

Products of degradation : These products are carbon oxides (CO, CO₂) and water, nitrogen oxides (NO, NO₂...).

Toxicity of the products of biodegradation : The products of degradation are less toxic than the product itself.

Environmental fate : Not available.

Environmental hazards : No known significant effects or critical hazards.




Toxicity to the environment : Not available.

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Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	Not applicable (gas).		-
TDG Classification	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	Not applicable (gas).		<p>Explosive Limit and Limited Quantity Index 0.125</p> <p>ERAP Index 3000</p> <p>Passenger Carrying Ship Index Forbidden</p> <p>Passenger Carrying Road or Rail Index Forbidden</p>
Mexico Classification	UN1954	COMPRESSED GAS, FLAMMABLE, N.O.S.	2.1	Not applicable (gas).		-

Section 15. Regulatory information

United States

U.S. Federal regulations : TSCA 4(a) final test rules: Pentane
TSCA 8(a) PAIR: Pentane
TSCA 8(b) inventory: Nitrogen; Ethylene; But-1-ene; Hydrogen; Ethane; Pentane; (e)-but-2-ene; Butane; Methane; (z)-but-2-ene
TSCA 12(b) one time export: Pentane
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Nitrogen; Ethylene; Hydrogen; Ethane; Pentane; Butane; Methane
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Nitrogen: Sudden Release of Pressure; Ethylene: Fire hazard, reactive, Sudden Release of Pressure, Delayed (Chronic) Health Hazard; Hydrogen: Fire hazard, Sudden Release of Pressure; Ethane: Fire hazard, Sudden Release of Pressure, Immediate (Acute) Health Hazard; Pentane: Fire hazard, Immediate (Acute) Health Hazard; Butane: Fire hazard, Sudden Release of Pressure; Methane: Fire hazard, Sudden Release of Pressure
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.

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Clean air act (CAA) 112 accidental release prevention: Ethylene; But-1-ene; Hydrogen; Ethane; Pentane; (e)-but-2-ene; Butane; Methane; (z)-but-2-ene

Clean air act (CAA) 112 regulated flammable substances: Ethylene; But-1-ene; Hydrogen; Ethane; Pentane; (e)-but-2-ene; Butane; Methane; (z)-but-2-ene

Clean air act (CAA) 112 regulated toxic substances: No products were found.

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	: Ethylene	74-85-1	6.1 - 99
Supplier notification	: Ethylene	74-85-1	6.1 - 99

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations : Pennsylvania RTK: Nitrogen: (generic environmental hazard); Ethylene: (environmental hazard, generic environmental hazard); But-1-ene: (generic environmental hazard); Hydrogen: (generic environmental hazard); Ethane: (generic environmental hazard); Pentane: (generic environmental hazard); (e)-but-2-ene: (generic environmental hazard); Butane: (generic environmental hazard); Methane: (generic environmental hazard); (z)-but-2-ene: (generic environmental hazard)
 Massachusetts RTK: Nitrogen; Ethylene; But-1-ene; Hydrogen; Ethane; Pentane; (e)-but-2-ene; Butane; Methane; (z)-but-2-ene
 New Jersey: Nitrogen; Ethylene; Hydrogen; Ethane; Pentane; Butane; Methane

Canada

WHMIS (Canada) : Class A: Compressed gas.
 Class D-1B: Material causing immediate and serious toxic effects (TOXIC).
 Class D-2A: Material causing other toxic effects (VERY TOXIC).
 CEPA DSL: Nitrogen; Ethylene; But-1-ene; Hydrogen; Ethane; Pentane; (e)-but-2-ene; Butane; Methane; (z)-but-2-ene

Section 16. Other information

United States

Label Requirements : FLAMMABLE GAS.
 CONTENTS UNDER PRESSURE.
 HARMFUL IF SWALLOWED.
 CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, HEART, RESPIRATORY TRACT, SKIN, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA, MUSCLE TISSUE.
 VAPOR MAY CAUSE FLASH FIRE.
 POSSIBLE CANCER HAZARD
 CONTAINS MATERIAL WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA.

Canada

Label Requirements : Class A: Compressed gas.
 Class D-1B: Material causing immediate and serious toxic effects (TOXIC).
 Class D-2A: Material causing other toxic effects (VERY TOXIC).

Hazardous Material Information System (U.S.A.)

Health	2
Fire hazard	4
Reactivity	0
Personal protection	C

National Fire Protection Association (U.S.A.)



Notice to reader

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To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.