

SAFETY DATA SHEET

SECTION 1 – IDENTIFICATION

Chemical Name: Ethylene
Chemical Formula: C₂H₄
Chemical Family: Flammable Gas/ Liquefied Petroleum Gases
Hazard Classification: Ethylene, UN1962, Red Label
Product Use Description: Analytical Standard and General Laboratory Applications
Company: MESA Specialty Gases & Equipment
2427 South Anne Street
Santa Ana, California 92704 USA
Phone Number for Information: Infotrac
Emergency Contact: 800-535-5053 (Int'l: 352-323-3500)

SECTION 2 – HAZARD(S) IDENTIFICATION

SIGNAL WORD - DANGER

HAZARD STATEMENTS: Extremely flammable gas. Contains gas under pressure; may explode if heated.
May cause suffocation by displacing oxygen in the air.
May form explosive mixtures with air.
May cause frostbite.

PRECAUTIONARY STATEMENTS:

General: Use in accordance with Safety Data Sheets.
Do not ingest or inhale. Avoid contact with skin and clothing.

Prevention: Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. No smoking.

Response: Leaking gas fire: Do not extinguish unless leak can be stopped safely.
In case of leakage, eliminate all ignition sources.
Do not open valve until prepared to use.
Always use a back flow preventative device in piping.

Storage: Protect from sunlight. Store in a well-ventilated place.

OTHER HAZARDS: High pressure gas. May cause rapid suffocation.
May cause dizziness, nausea, drowsiness, vomiting, excess salivation, loss of mobility/consciousness.
May react explosively even in absence of air at elevated pressure and/or temperature.
Self-contained breathing apparatus (SCBA) may be required.



SECTION 3 – COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS NO.	CONCENTRATION
Ethylene	74-85-1	> 99.99%
Maximum Impurities		< 0.01%

SECTION 4 – FIRST AID MEASURES

ROUTE OF EXPOSURE:

Inhalation:

Remove victim(s) to fresh air as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Only trained personnel should administer supplemental oxygen.

Eye contact: Immediately flush eyes with plenty of water.

Skin contact: Immediately flush skin with plenty of water. Remove any contaminated clothing and shoes.

Ingestion: Do not induce vomiting unless instructed to do so by medical personnel. If conscious, drink plenty of water. Never give anything by mouth to an unconscious person.

Frostbite: place the frostbitten part in warm water. **DO NOT USE HOT WATER.** If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

SYMPTOMS: Ethylene is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Rapid evaporation of liquid from the cylinder may cause frostbite. High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The skin of a victim may have a blue color. Under some circumstances, death may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION SYMPTOMS OF EXPOSURE

12-16% Oxygen: Breathing and pulse rate increased, muscular coordination slightly disturbed.

10-14% Oxygen: Emotional upset, abnormal fatigue, disturbed respiration.

6-10% Oxygen: Nausea and vomiting, collapse or loss of consciousness.

Below 6%: Convulsive movements, possible respiratory collapse, and death.



OTHER POTENTIAL HEALTH EFFECTS: Contact with the liquefied gas or rapidly expanding gases may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact can quickly subside.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Overexposure to Ethylene may cause the following health effects:

ACUTE: The most significant hazard associated with this gas is inhalation of oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, headache, dizziness and nausea. At high concentrations, unconsciousness or death may occur. Contact with liquefied gas or rapidly expanding gases may cause frostbite.

CHRONIC: Ethylene is considered a weak heart sensitizing agent, based on animal tests.

TARGET ORGANS: Respiratory system.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	2
FLAMMABILITY		(RED)	4
REACTIVITY		(YELLOW)	2
PROTECTIVE EQUIPMENT			B
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

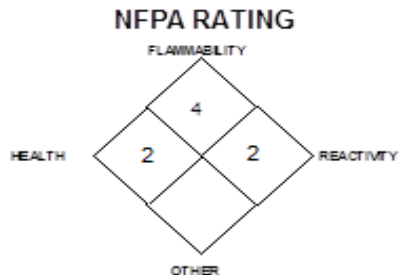
SECTION 5 – FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: : Extinguish Ethylene fires by shutting off the source of the gas. Use water spray or a foam agent to cool fire-exposed containers, structures, and equipment.

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this material may ignite and produce toxic gases, including carbon monoxide and carbon dioxide. Gas cylinders may rupture violently when exposed to fire. Continue to cool fire exposed cylinders until flames are extinguished. Cylinder valve is equipped with a pressure relief device to safely vent the cylinder if it is exposed to elevated pressure in a fire.

In presence of oxidizing materials, reducing materials, or combustible materials, or organic materials, mixture will be extremely flammable.

Fires impinging (direct flame) on the outside surface of unprotected pressure storage vessels of Isobutane can be very dangerous. Direct flame exposure on the cylinder wall can cause an explosion either by BLEVE (Boiling Liquid Expanding Vapor Explosion), or by exothermic decomposition. This is a catastrophic failure of the vessel releasing the contents into a massive fireball and explosion. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the vessel. For massive fires in large areas, use unmanned hose holder or monitor no from area and allow fire to burn.



Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Static discharge may cause Isobutane to ignite explosively if released.

SPECIAL FIRE FIGHTING PROCEDURES: RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO Ethylene WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations. Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of vessel exposures, evacuate the area. Refer to the North American Emergency Response Guidebook for further information.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES: Wear self-contained breathing apparatus when entering area unless atmosphere is proven to be safe. Monitor oxygen level. Shut off gas supply if this can be done safely. Isolate and ventilate the area until gas has dispersed.

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area, protect people, and respond with trained personnel. Adequate fire protection must be provided. Minimum Personal Protective Equipment should be Level B: fire-retardant protective clothing, gloves resistant to tears, and Self-Contained Breathing Apparatus.

Use only non-sparking tools and equipment. Locate and seal the source of the leaking gas. Protect personnel attempting the shut off with water spray. Allow the gas to dissipate. Monitor the surrounding area for combustible gas levels and oxygen. Combustible gas concentration must be below 10% of the LEL (LEL = 2.75%) prior to entry. The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in place or remove it to a safe area and allow the gas to be released there.

THIS IS AN EXTREMELY FLAMMABLE GAS. Protection of all personnel and the area must be maintained.

ENVIRONMENTAL PRECAUTIONS: Prevent spreading of vapors through sewers, ventilation systems, and confined areas. Do not discharge materials into any place where their accumulation could be dangerous.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP: Stop the flow of gas or remove cylinder to outdoor location if this can be done without risk. Ventilate enclosed areas. Move leaking cylinder to fume hood or safe outdoor area. Use monitoring equipment if hazardous conditions are suspected or likely to occur.

SECTION 7 – HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Isolate from oxidizers such as oxygen, chlorine, or fluorine. Use a check valve or trap in the discharge line to prevent hazardous backflow. Post “No Smoking or Open Flame” signs in storage and use areas. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand truck. Do not drag, slide, or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap, if provided, in place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Isobutane. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, Safe Handling of Compressed Gases in Containers. Additionally, refer to CGA Bulletin SB-2 “Oxygen Deficient Atmospheres”.

CONDITIONS FOR SAFE STORAGE: Cylinders should be secured with mounting brackets away from heavily traveled areas. Use oldest cylinders in stock first to prevent full cylinders from being stored for excessive periods of time. Full and empty cylinders should be segregated. Keep cylinder in dry, cool, well ventilated area away from heat, flame, sparks or corrosive chemicals. Cylinders should be moved by suitable hand trucks. Close valve after each use and when empty. Cylinder valve guards or caps should be in place. Keep cylinder at room temperature (21°C/ 70°F). Store containers in location free from fire risk and away from any sources of heat and ignition. Keep cylinder at least 20 feet away from combustible material, oxidizers, and Oxygen. Use equipment rated for cylinder pressure.

SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

COMPONENT	OSHA PEL	ACGIH TLV
Ethylene	None	200 ppm

APPROPRIATE ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents Ethylene dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the presence of potentially explosive air-gas mixtures and the level of oxygen.

INDIVIDUAL PROTECTIVE MEASURES: Safety glasses, work gloves, and safety shoes should be worn when handling high pressure cylinders or hazardous materials. Avoid skin contact with leaking liquid (danger of frostbite). Wear suitable protective equipment. Ensure adequate ventilation, especially in confined areas. Do not eat, drink, or smoke when using.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of Ethylene. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards. The following are NIOSH recommendations for Ethylene concentrations in air and are provided for further information:

CONCENTRATION RESPIRATORY EQUIPMENT

Up to 2100 ppm: Facepiece Self-Contained Breathing Apparatus (SCBA) or full-facepiece Supplied-Air Respirator (SAR).
 Emergency or Planned Entry into Unknown Concentration or IDLH Conditions: Positive pressure, full-facepiece SCBA or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.
 Escape: Escape-type SCBA.

NOTE: The IDLH concentration for Ethylene is 2100 ppm, which is based on the LEL. It must be noted that protection for chemical overexposures is not effective protection from burns in the event of a fire.

EYE PROTECTION: Splash goggles or safety glasses, for protection from rapidly expanding gases and splashes of liquid Ethylene. Additionally, face shields should be worn for Liquid Ethylene use.

HAND PROTECTION: Wear mechanically resistant-gloves when handling cylinders of Ethylene. Use low-temperature protective gloves (e.g., Kevlar) when working with containers of Liquid Ethylene.

BODY PROTECTION: Use body protection appropriate for task. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from splashes of liquefied product, as well as fire retardant items.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Colorless	Upper/lower flammability/explosive limits: No data available
Odor: Slightly sweet	Vapor Pressure: N/A
Odor threshold: No data available	Vapor Density (Air=1): 566 kg/m ³ (35.3 lb/ft ³)
pH: N/A	Relative Density (Water=1): Varies
Melting point/range: -103.77°C (-154.8°F)	Solubility (in water): Very slight.
Boiling point/range: -169.15°C (-272.5°F)	Partition coefficient (n-octanol/water): N/A
Flash Point: N/A	Auto-ignition temperature: No data available
Evaporation Rate (Butyl Acetate=1): N/A	Decomposition temperature: No data available
Flammability (solid, gas): No data available	Viscosity: N/A

SECTION 10 – STABILITY AND REACTIVITY DATA

Reactivity: No specific data available	Conditions to avoid: Contact with incompatible materials and exposure to heat, sparks, and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.
Chemical Stability: Stable	Incompatible materials: Strong oxidizers (e.g., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride).
Possibility of hazardous reactions: No data available	Hazardous Decomposition or Byproducts: When ignited in the presence of oxygen, this gas will burn to produce carbon monoxide, carbon dioxide.

SECTION 11 – TOXICOLOGICAL INFORMATION

LIKELY ROUTES OF EXPOSURE:

Skin Contact (Rabbit): Several formulations containing an isobutane-Ethylene mixture were tested for skin irritation effects. All formulations contained less than 13% Ethylene. All of the formulations containing Ethylene caused only mild irritation.

Effects on Short-Term Inhalation: Guinea-pigs breathing 5.5% Ethylene by volume developed tremors after 5 minutes. Nausea, retching, and stupefaction were observed when animals were exposed for 30-120 minutes. All the animals survived a two-hour exposure and had no significant tissue damage. A gas concentration of 89% did not cause anesthesia, but depressed the blood pressure of cats. Inhalation of 10 percent Ethylene by mice and 15% by dogs cause weak cardiac sensitization. Presumably, all of these effects are reversible when exposure ceases. In primates, 10% Ethylene caused some change in heart function. At 20% there was aggravation of these symptoms and respiratory depression.

Effects of Long-Term Inhalation: No toxicity or abnormalities were observed when monkeys were exposed to approximately 750 ppm for 90 days. Similar results were obtained when monkeys were exposed to an aerosol spray containing 65%

SYMPTOMS/EFFECTS FROM EXPOSURE: Ethylene is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Rapid evaporation of liquid from the cylinder may cause frostbite. High concentrations of this gas can cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The skin of a victim may have a blue color. Under some circumstances, death may occur.

ACUTE/CHRONIC TOXICITY:

SUSPECTED CANCER AGENT: Ethylene is not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA, and therefore is neither considered to be nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Ethylene is not irritating; however, contact with rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Ethylene is not known to cause sensitization in humans; however, some animal studies indicate that exposure to Ethylene can cause weak cardiac sensitization.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects Ethylene on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for Ethylene.

Embryotoxicity: No embryotoxic effects have been described for Ethylene.

Teratogenicity: No teratogenicity effects have been described for Ethylene.

Reproductive Toxicity: No reproductive toxicity effects have been described for Ethylene.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by overexposure to Ethylene.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary. Treat symptoms and eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, there are no Biological Exposure Indices for Ethylene.

CARCINOGENICITY: May cause cancer depending on duration and level of exposure.

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicity (aquatic and terrestrial): : Any adverse effect on animals would be related to oxygen-deficient environments. No adverse effect is anticipated to occur to plant life, except for frost produced in the presence of rapidly expanding gases. No evidence is currently available on Ethylene's effects on aquatic life.
Persistence and degradability: No data available
Bioaccumulative potential: No data available
Mobility in soil: No data available

Other Effects: The mixture does not contain any class I or Class II ozone depleting chemicals.

SECTION 13 – DISPOSAL CONSIDERATIONS

Disposal: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with any residual product to MESA Specialty Gas & Equipment Inc. Do not dispose of locally.

SECTION 14 – TRANSPORTATION INFORMATION

DOT Classification:

Proper Shipping Name: Ethylene
Class: 2.1
UN/ID No.: UN1962
Label: Flammable Gas, Red Label

Alternate Description:

Proper Shipping Name: Ethylene
Class: 2.1
UN/ID No.: UN1962
Label: Flammable Gas, Red Label

Environment hazard: No

Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code: N/A

SPECIAL PRECAUTIONS FOR USER: Avoid transport on vehicles where the load space is not separated from driver's compartment. Ensure that transporter is aware of the potential hazards of the load and knows what to do in event of an emergency. Contact supplier for complete transportation information.

SECTION 15 – REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Ethylene is not subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act.

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

CANADIAN DSL/NDL INVENTORY STATUS: Ethylene is on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Ethylene is on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Ethylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 lb. Depending on specific operations involving the use of Ethylene, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation Ethylene is not listed in Appendix A; however, any process that involves a flammable gas on-site, in one location, in quantities of 10,000 lb (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

U.S. STATE REGULATORY INFORMATION: Ethylene is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Ethylene.

California - Permissible Exposure Limits for Chemical Contaminants: Ethylene. Florida - Substance List: No.

Illinois - Toxic Substance List: Ethylene. Kansas - Section 302/313 List: No. Massachusetts - Substance List: Ethylene.

Michigan - Critical Materials Register: No.

Minnesota - List of Hazardous Substances: Ethylene. Missouri - Employer Information/Toxic Substance List: Ethylene.

New Jersey - Right to Know Hazardous Substance List: Ethylene. North Dakota - List of Hazardous Chemicals, Reportable Quantities: No. Pennsylvania - Hazardous Substance List: Ethylene.

Rhode Island - Hazardous Substance List: Ethylene. Texas - Hazardous Substance List: Ethylene. West Virginia - Hazardous Substance List: Ethylene. Wisconsin - Toxic and Hazardous Substances: Ethylene.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Ethylene is not on the California Proposition 65 lists.

LABELING:

DANGER: EXTREMELY FLAMMABLE GAS. CONTAINS GAS UNDER PRESSURE; MAY EXPLODE IF HEATED. MAY CAUSE RAPID SUFFOCATION BY DISPLACING OXYGEN IN THE AIR. MAY FORM EXPLOSIVE MIXTURES WITH AIR.

May cause dizziness, nausea, drowsiness, vomiting, excess salivation, and loss of mobility/consciousness. May react explosively even in absence of air at elevated pressure and/or temperature. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources—No smoking. Use and store in well-ventilated areas. Leaking gas fire: Do not extinguish unless leak can be stopped safely. In case of leakage, eliminate all ignition sources. Do not open valve until prepared to use. Always use a backflow preventative device in piping. Use only with equipment rated for cylinder pressure. Close valve after each use and when empty. Cylinder temperature should not exceed 52°C (125°F). Use in accordance with Safety Data Sheet. **FIRST AID: IF INHALED,** remove to fresh air. If breathing is difficult, give Oxygen. Call a physician. **IN CASE OF FROSTBITE,** obtain immediate medical attention. **DO NOT REMOVE THIS LABEL.**

SECTION 16 – OTHER INFORMATION

Information contained in this data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable. But the accuracy and completeness thereof, is not guaranteed and no warranty of any kind, either expressed or implied, is made with respect thereto. Since MESA Specialty Gases and Equipment Division of MESA International Technologies, Inc. shall have no control over the use of the product described herein, we assume no liability for loss or damage incurred from the proper or improper use of such product.

HISTORY:

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DISCLAIMER

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