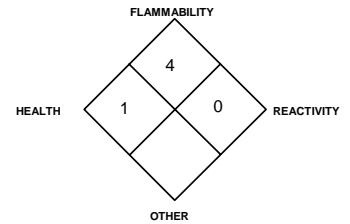


**NFPA RATING**

# MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

## **PART I** *What is the material and what do I need to know in an emergency?*

### 1. PRODUCT IDENTIFICATION

**CHEMICAL NAME; CLASS:** **ETHANE - C<sub>2</sub>H<sub>6</sub>, GASEOUS**  
**ETHANE - C<sub>2</sub>H<sub>6</sub>, LIQUEFIED (Cryogenic)**  
 Document Number: Ethane

**PRODUCT USE:** For general analytical/synthetic chemical uses.

**SUPPLIER/MANUFACTURER'S NAME:** MESA Specialty Gases & Equipment  
**ADDRESS:** 3619 Pendleton Avenue, Suite C  
 Santa Ana, CA 92704

**BUSINESS PHONE:** 1-714-434-7102  
**EMERGENCY PHONE:** INFOTRAC: 1-800-535-5053

**DATE OF PREPARATION:** May 10, 1999

### 2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR				OTHER
			ACGIH		OSHA		
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	
Ethane	74-84-0	> 95.0	There are no specific exposure limits for Ethane. Ethane is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.				
Maximum Impurities		< 5.0	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.				

NE = Not Established

C = Ceiling Limit

See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

### 3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** Ethane is a colorless, odorless, flammable gas or a colorless, odorless, flammable cryogenic liquid. The liquid rapidly boils to a gas at standard atmospheric temperatures and pressures. Ethane is an asphyxiant and presents a significant health hazard by displacing the oxygen in the atmosphere. Both the liquid and gas pose a serious fire hazard when accidentally released. The gas is heavier than air and may spread long distances. Distant ignition and flashback are possible. Contact with liquid or rapidly expanding gases may cause frostbite. Flame or high temperature impinging on a localized area of the cylinder of Ethane can cause the cylinder to rupture without activating the cylinder's relief devices. Provide adequate fire protection during emergency response situations.

### SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE:

The most significant route of overexposure for this gas is by inhalation. The following paragraphs describe symptoms of exposure by route of exposure.

**INHALATION:** 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**

12-16% Oxygen:

10-14% Oxygen:

6-10% Oxygen:

Below 6%:

#### **SYMPTOMS OF EXPOSURE**

Breathing and pulse rate increased, muscular coordination slightly disturbed.

Emotional upset, abnormal fatigue, disturbed respiration.

Nausea and vomiting, collapse or loss of consciousness.

Convulsive movements, possible respiratory collapse, and death.



**OTHER POTENTIAL HEALTH EFFECTS:** Contact with the cryogenic liquid 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 Ethane 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 cryogenic liquid or rapidly expanding gases may cause frostbite.

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

**TARGET ORGANS:** Respiratory system.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	1
FLAMMABILITY		(RED)	4
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			B
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

**See Section 16 for Definition of Ratings**

## **PART II** *What should I do if a hazardous situation occurs?*

### **4. FIRST-AID MEASURES**

**RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO ETHANE 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.**

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. In case of 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.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

## 5. FIRE-FIGHTING MEASURES

FLASH POINT (Closed Cup): -135°C (-211°F)

AUTOIGNITION TEMPERATURE: 515°C (959°F)

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 3.0%

Upper (UEL): 12.5%

FIRE EXTINGUISHING MATERIALS: Extinguish Ethane 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 ignites to produce toxic gases including carbon monoxide and carbon dioxide.

**DANGER!** Fires impinging (direct flame) on the outside surface of unprotected pressure storage vessels of Ethane can be very dangerous.

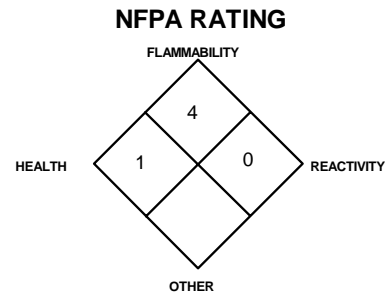
Direct flame exposure on the cylinder wall can cause an explosion either by BLEVE (Boiling Liquid Expanding Vapor Explosion), or by exothermic decomposition. This is a catastrophic failure of the vessel releasing the contents into a massive fireball and explosion. The resulting fire and explosion can 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 nozzles; if this is not possible, withdraw from area and allow fire to burn.

**RESPONSE TO FIRE INVOLVING CRYOGEN:** Cryogenic liquids can be particularly dangerous during fires because of their potential to rapidly freeze water. Careless use of water may cause heavy icing. Furthermore, relatively warm water greatly increases the evaporation rate of Ethane. If large concentrations of Ethane gas are present, the water vapor in the surrounding air will condense, creating a dense fog that may make it difficult to find fire exits or equipment. Liquid Ethane, when exposed to the atmosphere, will produce a cloud of ice/fog in the air upon its release. A flammable mixture will exist within the vapor cloud, and it is advisable that personnel keep well outside the area of visible moisture.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

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

**SPECIAL FIRE-FIGHTING PROCEDURES:** 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.



**See Section 16 for Definition of Ratings**

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## 6. ACCIDENTAL RELEASE MEASURES

**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 and protect people. 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 = 3.0%) prior to entry of response personnel. The atmosphere must have at least 19.5% 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.

**RESPONSE TO CRYOGENIC RELEASE:** Clear the affected area and allow the liquid to evaporate and the gas to dissipate. After the gas is formed, follow the instructions provided in the previous paragraph. If the area must be entered by emergency personnel, SCBA, Kevlar gloves, and appropriate foot and leg protection must be worn.

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

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## PART III *How can I prevent hazardous situations from occurring?*

### 7. HANDLING and STORAGE

**WORK PRACTICES AND HYGIENE PRACTICES:** As with all chemicals, avoid getting Ethane IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Ethane could occur without any significant warning symptoms.

**STORAGE AND HANDLING PRACTICES:** Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits. Post "No Smoking or Open Flames" signs in storage or use areas.

**SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS:** 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 work 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 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. Mark empty cylinders "EMPTY".

**NOTE:** Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with this product. 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" and NFPA Bulletin 58.

**PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:** Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (e.g., nitrogen) before attempting repairs.

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## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents Ethane 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.

**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 Ethane. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

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

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

**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.

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## 9. PHYSICAL and CHEMICAL PROPERTIES

**VAPOR DENSITY:** 1.242 kg/m<sup>3</sup> (0.0799 lb/ft<sup>3</sup>)

**SPECIFIC GRAVITY (air=1):** 1.048

**SOLUBILITY IN WATER:** Very slight.

**EVAPORATION RATE (nBuAc = 1):** Not applicable.

**COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

**ODOR THRESHOLD:** Not established.

**pH:** Not applicable.

**FREEZING POINT:** -183.1°C (-297.9°F)

**BOILING POINT @ 1 atm:** -88.6°C (-127.5°F)

**EXPANSION RATIO:** 437 (cryogenic liquid)

**SPECIFIC VOLUME (ft<sup>3</sup>/lb):** 12.8

**VAPOR PRESSURE (psia):** 557.7

**APPEARANCE AND COLOR:** Colorless, odorless gas. The cryogenic liquid is also colorless and odorless.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** There are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

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## 10. STABILITY and REACTIVITY

**STABILITY:** Stable.

**DECOMPOSITION PRODUCTS:** When ignited in the presence of oxygen, this gas will burn to produce carbon monoxide, carbon dioxide.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:** Strong oxidizers (e.g., chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride).

**HAZARDOUS POLYMERIZATION:** Will not occur.

**CONDITIONS TO AVOID:** Contact with incompatible materials and exposure to heat, sparks, and other sources of ignition.

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## **PART IV** *Is there any other useful information about this material?*

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### **11. TRANSPORTATION INFORMATION**

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

**For Ethane Gas:**

PROPER SHIPPING NAME: Ethane  
HAZARD CLASS NUMBER and DESCRIPTION: 2.1 (Flammable Gas)  
UN IDENTIFICATION NUMBER: UN 1035  
PACKING GROUP: Not Applicable  
DOT LABEL(S) REQUIRED: Flammable Gas  
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

**For Liquefied Ethane:**

PROPER SHIPPING NAME: Ethane, refrigerated liquid  
HAZARD CLASS NUMBER and DESCRIPTION: 2.1 (Flammable Gas)  
UN IDENTIFICATION NUMBER: UN 1961  
PACKING GROUP: Not Applicable  
DOT LABEL(S) REQUIRED: Flammable Gas  
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115  
MARINE POLLUTANT: Ethane is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

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The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. MESA Specialty Gases & Equipment assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, MESA Specialty Gases & Equipment assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

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