1. Identification

Product identifier: ETHANE

Other means of identification:
- SDS number: 304-GHS
- Synonyms: Ethyl Hydride, Bimethyl, Methylmethane, Dimethyl

Recommended use:
This product is intended for use as a refinery feedstock, fuel or for use in engineered processes. Use in other applications may result in higher exposures and require additional controls, such as local exhaust ventilation and personal protective equipment.

Recommended restrictions:
None known.

Manufacturer/Importer/Supplier/Distributor information:

Manufacturer/Supplier: Valero Marketing & Supply Company and Affiliates
One Valero Way
San Antonio, TX 78269-6000

General Assistance:
210-345-4593

E-Mail: CorpHSE@valero.com

Contact Person: Industrial Hygienist

Emergency Telephone:
- 24 Hour Emergency: 866-565-5220
- 1-800-424-9300 (CHEMTREC USA)

2. Hazard(s) identification

Physical hazards:
- Category 1: Flammable gases
- Gases under pressure

Health hazards:
Not classified.

OSHA defined hazards:
Simple asphyxiant

Label elements:
- Signal word: Not available.
- Hazard statement: Extremely flammable gas. Contains gas under pressure; may explode if heated.

Precautionary statement:
- Prevention: Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- Response: Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources if safe to do so.
- Storage: Protect from sunlight. Store in a well-ventilated place.
- Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC):
None known.

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Substances</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane</td>
<td>74-84-0</td>
<td>95 - 100</td>
<td></td>
</tr>
<tr>
<td>Propane</td>
<td>74-98-6</td>
<td>0 - 5</td>
<td></td>
</tr>
<tr>
<td>Methane</td>
<td>74-82-8</td>
<td>0 - 2</td>
<td></td>
</tr>
</tbody>
</table>
Composition comments

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation
Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration.
Call a physician or poison control center immediately.

Skin contact
Wash frost-bitten areas with plenty of water. Do not remove clothing. Get medical attention immediately.

Eye contact
Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Ingestion
Ingestion is not a typical route of exposure for gases or liquefied gases.

Most important symptoms/effects, acute and delayed
Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").

Indication of immediate medical attention and special treatment needed
Treat symptomatically.

5. Fire-fighting measures

Suitable extinguishing media
Dry powder. Carbon dioxide (CO2).

Unsuitable extinguishing media
Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical
During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters
Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire-fighting equipment/instructions
Wear full protective clothing, including helmet, self-contained positive pressure or pressure demand breathing apparatus, protective clothing and face mask. If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also consider initial evacuation for 800 meters (1/2 mile) in all directions. ALWAYS stay away from tanks engulfed in flame. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tanks due to fire. Move containers from fire area if you can do it without risk. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Stay upwind. Ventilate closed spaces before entering. Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Wear suitable protective clothing, gloves and eye/face protection.

Methods and materials for containment and cleaning up
Ventilate well, stop flow of gas or liquid if possible. Remove ignition sources. Do not allow chemical to enter confined spaces such as sewers due to explosion risk. Sewers designed to preclude formation of explosive concentrations of vapor may be permitted.

Environmental precautions
Stop leak if possible without any risk. Sewers must be covered and basements and workpits evacuated. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

Precautions for safe handling
Eliminate sources of ignition. Avoid spark promoters. Ground/bond container and equipment. These alone may be insufficient to remove static electricity. Before entering storage tanks and commencing any operation in a confined area, check the atmosphere for oxygen content, hydrogen sulfide (H2S) and flammability. Provide adequate ventilation. Avoid contact with eyes, skin, and clothing. Material may deplete oxygen from the air to dangerously low levels. Avoid breathing gas. Wear appropriate personal protective equipment. The product is extremely flammable. May form explosive mixtures with air. Avoid heat, sparks, open flames and other ignition sources. Ground container and transfer equipment to eliminate static electric sparks. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities
Flammable compressed gas storage. Keep away from heat, sparks and open flame. Keep in a cool, well-ventilated place. Store away from incompatible materials.
8. Exposure controls/personal protection

Occupational exposure limits
US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane (CAS 74-98-6)</td>
<td>PEL</td>
<td>1800 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000 ppm</td>
</tr>
</tbody>
</table>

US. NIOSH: Pocket Guide to Chemical Hazards

<table>
<thead>
<tr>
<th>Components</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane (CAS 74-98-6)</td>
<td>TWA</td>
<td>1800 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000 ppm</td>
</tr>
</tbody>
</table>

Biological limit values
No biological exposure limits noted for the ingredient(s).

Exposure guidelines
No exposure standards allocated.

Appropriate engineering controls
Observe Occupational Exposure Limits and minimize the risk of inhalation. Use explosion-proof equipment.

Individual protection measures, such as personal protective equipment

**Eye/face protection**
Risk of contact: Wear goggles/face shield.

**Skin protection**

**Hand protection**
Risk of contact: Wear cold insulating gloves. Suitable gloves can be recommended by the glove supplier.

**Other**

**Respiratory protection**
In case of inadequate ventilation, use air-supplied full-mask. Seek advice from local supervisor.

**Thermal hazards**
Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations
Handle in accordance with good industrial hygiene and safety practice. Observe any medical surveillance requirements.

9. Physical and chemical properties

**Appearance**
Compressed liquefied gas.

**Physical state**
Gas.

**Form**
Compressed liquefied gas.

**Color**
Colorless.

**Odor**
Weak odor. Sweetish.

**Odor threshold**
Not available.

**pH**
Not available.

**Melting point/freezing point**
-277.87 °F (-172.15 °C)

**Initial boiling point and boiling range**
-126.4 °F (-88 °C)

**Flash point**
-211.3 °F (-135.2 °C)

**Evaporation rate**
Not available.

**Flammability (solid, gas)**
Not available.

**Upper/lower flammability or explosive limits**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability limit - lower (%)</td>
<td>3 %</td>
</tr>
<tr>
<td>Flammability limit - upper (%)</td>
<td>12.5 %</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive limit - lower (%)</td>
<td>Not available.</td>
</tr>
<tr>
<td>Explosive limit - upper (%)</td>
<td>Not available.</td>
</tr>
</tbody>
</table>

**Vapor pressure**
4199.64 kPa at 25 °C
4194.11 kPa at 25 °C

**Vapor density**
1.1 (Air=1)

**Relative density**
0.546 (Water= 1)
Solubility (water) Insoluble in the cold water.

Partition coefficient (n-octanol/water) 1.81

Auto-ignition temperature 986 °F (530 °C)
881.6 °F (472 °C)
882 °F (472.22 °C)

Decomposition temperature Not available.

Viscosity Not available.

Other information
- Density 0.45 g/cm³ estimated
- Dynamic viscosity 0.06 mPa.s
- Dynamic viscosity temperature -109.3 °F (-78.5 °C)
- Kinematic viscosity 0.14 mm²/s estimated
- Molecular formula C2-H6
- Molecular weight 30.08 g/mol
- Percent volatile Essentially 100%
- VOC (Weight %) 100

10. Stability and reactivity

Reactivity Not available.

Chemical stability Stable at normal conditions. Heat may cause the containers to explode.

Possibility of hazardous reactions Hazardous polymerization does not occur. Hazardous reactions do not occur.

Conditions to avoid Heat, sparks, flames, elevated temperatures. Contact with incompatible materials.

Incompatible materials Strong acids, alkalis and oxidizing agents. Reducing agents.

Hazardous decomposition products Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.

11. Toxicological information

Information on likely routes of exposure
- Ingestion Not likely, due to the form of the product.
- Inhalation Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels.
- Skin contact Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.
- Eye contact Contact with liquefied gas can cause damage (frostbite) due to rapid evaporative cooling.

Symptoms related to the physical, chemical and toxicological characteristics Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").

Information on toxicological effects

Acute toxicity Suffocation (asphyxiant) hazard - if allowed to accumulate to concentrations that reduce oxygen below safe breathing levels. Exposure to rapidly expanding gas or vaporizing liquid may cause frostbite ("cold burn").

<table>
<thead>
<tr>
<th>Components</th>
<th>Species</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propane (CAS 74-98-6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC50</td>
<td>Rat</td>
<td>&gt; 1442 mg/l, 15 Minutes</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation Based on available data, the classification criteria are not met.

Serious eye damage/eye irritation Based on available data, the classification criteria are not met.

Respiratory or skin sensitization

Respiratory sensitization Based on available data, the classification criteria are not met.
Skin sensitization
Based on available data, the classification criteria are not met.

Germ cell mutagenicity
Based on available data, the classification criteria are not met.

Carcinogenicity
Based on available data, the classification criteria are not met.

Reproductive toxicity
Based on available data, the classification criteria are not met.

Specific target organ toxicity - single exposure
Based on available data, the classification criteria are not met.

Specific target organ toxicity - repeated exposure
Based on available data, the classification criteria are not met.

Aspiration hazard
Based on available data, the classification criteria are not met.

12. Ecological information

Ecotoxicity
The product is a volatile organic compound which has a photochemical ozone creation potential.

Persistence and degradability
Not available.

Bioaccumulative potential

<table>
<thead>
<tr>
<th>Partition coefficient n-octanol / water (log Kow)</th>
<th>ETHANE (CAS 74-84-0)</th>
<th>1.81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane (CAS 74-84-0)</td>
<td>1.81</td>
<td></td>
</tr>
<tr>
<td>Methane (CAS 74-82-8)</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Propane (CAS 74-98-6)</td>
<td>2.36</td>
<td></td>
</tr>
</tbody>
</table>

Mobility in soil
Not available.

Other adverse effects
Not available.

13. Disposal considerations

Disposal instructions
Dispose in accordance with all applicable regulations. This material and its container must be disposed of as hazardous waste.

Hazardous waste code
D001

Waste from residues / unused products
Dispose of in accordance with local regulations.

Contaminated packaging
Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN1035</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN proper shipping name</td>
<td>Ethane</td>
</tr>
<tr>
<td>Transport hazard class(es)</td>
<td>2.1</td>
</tr>
<tr>
<td>Class</td>
<td>2.1</td>
</tr>
<tr>
<td>Subsidiary risk</td>
<td>-</td>
</tr>
<tr>
<td>Packing group</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.

Packaging exceptions
306

Packaging non bulk
304

Packaging bulk
302

IATA

<table>
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<tr>
<td>Label(s)</td>
<td>2.1</td>
</tr>
<tr>
<td>Packing group</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

Environmental hazards
No.

ERG Code
10L

Special precautions for user
Read safety instructions, SDS and emergency procedures before handling.

IMDG

<table>
<thead>
<tr>
<th>UN number</th>
<th>UN1035</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN proper shipping name</td>
<td>ETHANE</td>
</tr>
</tbody>
</table>
Transport hazard class(es)

Class: 2.1
Subsidiary risk: -
Label(s): 2.1

Packing group: Not applicable.

Environmental hazards

Marine pollutant: No.
EmS: F-D, S-U

Special precautions for user:
Read safety instructions, SDS and emergency procedures before handling.

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

Not applicable. This product is a compressed or liquefied gas and when transported in bulk is covered under IGC code.

15. Regulatory information

US federal regulations
This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane (CAS 74-84-0)</td>
<td>LISTED</td>
</tr>
<tr>
<td>Methane (CAS 74-82-8)</td>
<td>LISTED</td>
</tr>
<tr>
<td>Propane (CAS 74-98-6)</td>
<td>LISTED</td>
</tr>
</tbody>
</table>

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories
Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance
Not listed.

SARA 311/312 Hazardous chemical
Yes

SARA 313 (TRI reporting)
Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List
Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

<table>
<thead>
<tr>
<th>Substance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane (CAS 74-84-0)</td>
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<td></td>
</tr>
<tr>
<td>Propane (CAS 74-98-6)</td>
<td></td>
</tr>
</tbody>
</table>

Safe Drinking Water Act (SDWA)
Not regulated.

US state regulations

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

WARNING: Byproducts of the combustion of propane contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.
California requires all "persons in the course of doing business" whose products are sold in California to comply with Proposition 65 (Cal. Health and Safety Code Sections 25249.6 et seq.). Accordingly, resellers of this product in California shall comply with Proposition 65, including the provision of any necessary warnings for exposure to chemicals listed by the State of California: http://oehha.ca.gov/prop65/prop65_list/files/P65single111811.pdf

US. Massachusetts RTK - Substance List
Ethane (CAS 74-84-0)
Methane (CAS 74-82-8)
Propane (CAS 74-98-6)

**US. New Jersey Worker and Community Right-to-Know Act**
- Ethane (CAS 74-84-0)
- Methane (CAS 74-82-8)
- Propane (CAS 74-98-6)

**US. Pennsylvania Worker and Community Right-to-Know Law**
- Ethane (CAS 74-84-0)
- Methane (CAS 74-82-8)
- Propane (CAS 74-98-6)

**US. Rhode Island RTK**
- Ethane (CAS 74-84-0)
- Methane (CAS 74-82-8)
- Propane (CAS 74-98-6)

**US. California Proposition 65**

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance
- Not listed.

### International Inventories

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*"Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

**16. Other information, including date of preparation or last revision**

**Issue date**
- 28-May-2014

**Revision date**
- 

**Version #**
- 01

**NFPA Ratings**

- Health: 0
- Flammability: 4
- Reactivity: 2
Disclaimer

This material Safety Data Sheet (SDS) was prepared in accordance with 29 CFR 1910.1200 by Valero Marketing & Supply Co., ("VALERO"). VALERO does not assume any liability arising out of product use by others. The information, recommendations, and suggestions presented in this SDS are based upon test results and data believed to be reliable. The end user of the product has the responsibility for evaluating the adequacy of the data under the conditions of use, determining the safety, toxicity and suitability of the product under these conditions, and obtaining additional or clarifying information where uncertainty exists. No guarantee expressed or implied is made as to the effects of such use, the results to be obtained, or the safety and toxicity of the product in any specific application. Furthermore, the information herein is not represented as absolutely complete, since it is not practicable to provide all the scientific and study information in the format of this document, plus additional information may be necessary under exceptional conditions of use, or because of applicable laws or government regulations.