

Safety Data Sheet (US)

1. Identification

Product Identifier: Propane, odorized

Other Means of Identification: Propyl Hydride, Dimethyl Methane, 1-Propene Tetramer, L.P.G. (Liquefied Petroleum Gas)

Product use: Fuel for heating, cooking, automobiles, welding/cutting; refrigerant, aerosol propellant

Restrictions on use: Do not use for purposes other than those listed above

Manufacturer: Keyera and Affiliates





Address: Suite 600, Sunlife Plaza West
144 – 4th Avenue SW
Calgary, AB, T2P 3N4

MSDS Information: 1-780-449-7910

Emergency Contact: 1-866-377-7110 (24 hours)

2. Hazards Identification

GHS Hazards

| Pictogram | Classification | Hazard Statements |
|---|--|---|
|  | Flammable Gases – Category 1 | Extremely flammable gas |
|  | Gases Under Pressure – Liquefied Gas | Contains gas under pressure; may explode if heated. |
|  | Specific Target Organ Toxicity, Single Exposure – Category 2 | May cause damage to heart. |
|  | Specific Target Organ Toxicity, Single Exposure – Category 3 | May cause drowsiness or dizziness. |
| No pictogram | Simple Asphyxiant | May displace oxygen and cause rapid suffocation. |

Other Hazards

- May cause frostbite upon sudden release of liquefied gas.

Signal Word: Danger

Precautionary Statements:

Prevention

- Keep away from heat/sparks/open flames/hot surfaces – No smoking.
- Do not breathe gas.
- Wash thoroughly after handling.
- Do not eat, drink or smoke when using this product.
- Use only outdoors or in a well-ventilated area.
- Wear protective gloves/ protective clothing/ eye protection/ face protection when handling liquefied propane.

Response

- Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
- Eliminate all ignition sources if safe to do so.

- If inhaled: Remove person to fresh air and keep comfortable for breathing.
- If exposed or concerned: Call a doctor/physician.

Storage

- Protect from sunlight.
- Store in a well-ventilated place. Keep container tightly closed.
- Store locked up.

Disposal

- Dispose of contents/container in accordance with applicable local, provincial/state, and federal regulations.

3. Composition/Information on Ingredients

Chemical Name: Propane
Common Name/Synonyms: Propyl Hydride, Dimethyl Methane, 1-Propene Tetramer, L.P.G. (Liquefied Petroleum Gas)

| Ingredient Name | Volume % | CAS No. |
|-------------------------------|-------------|----------|
| Methane | 0 – 0.3 | 74-82-8 |
| Ethane | 0.5 – 5.0 | 74-84-0 |
| Propane | 94.0 – 99.9 | 74-98-6 |
| iso-Butane | 0 – 2.0 | 75-28-5 |
| n-Butane | 0 – 0.5 | 106-97-8 |
| Ethyl Mercaptan (Ethanethiol) | 20 – 25 ppm | 75-08-1 |

4. First Aid Measures

Immediate Medical Attention and Special Treatment:

Treat symptomatically and supportively. Refer also to Table below.

| First Aid: | |
|-------------|---|
| Inhalation: | Remove person to fresh air and keep comfortable for breathing. If exposed or concerned: Call a doctor/physician. |
| Skin: | If cold, liquefied propane is on skin (or hair): take off immediately all contaminated clothing. Rinse skin with water/shower. If skin irritation occurs: get medical advice/attention. |
| Eyes: | Rinse cautiously with water for several minutes. If eye irritation persists: get medical advice/attention. |
| Ingestion: | Not expected to be a route of exposure. |

Most Important Effects and Symptoms, Acute or Delayed:

| Exposure Route | Health Effects | Symptoms of Exposure |
|----------------|--|---|
| Inhalation: | Propane may act as an asphyxiant by displacing oxygen in the ambient air, causing suffocation. | Loss of consciousness, death. |
| Skin: | Contact with liquefied gas may cause burn or frostbite. | numbness, cold, burning sensation, white, pale, greyish-yellow or red skin, blistering in severe cases. |
| Eyes: | Contact with liquefied gas may cause burn or eye damage. | numbness, cold or burning sensation, blistering to blindness in severe cases. |

5. Fire Fighting Measures

| | |
|---|--|
| <p>Flammability: Yes. Propane, liquefied or in gas form, are highly flammable.</p> | <p>Hazardous Combustion Products: Carbon monoxide (CO), carbon dioxide (CO₂), and acrid smoke.</p> |
| <p>Explosion: Sensitive to impact: No</p> | <p>Sensitive to static discharge: Yes</p> |
| <p>Extinguishing Media: Small Fire: dry chemical or CO₂. Large Fire: water spray or fog.</p> | |
| <p>Unsuitable Extinguishing Media:</p> <ul style="list-style-type: none"> • Foam. • Water jet: Do not direct water at source of leak, especially with LPG to avoid icing. | |
| <p>Special Protective Equipment for Firefighters:</p> <ul style="list-style-type: none"> • Wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full face-piece. • Wear thermal protective clothing when the fire involves liquefied propane. | |
| <p>Precautions for Firefighters:</p> <ul style="list-style-type: none"> • DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS THE LEAK CAN BE STOPPED. • If tank, rail car or tank truck is involved in a fire, ISOLATE and consider initial evacuation <u>in all directions</u> for 1600 meters (1 mile). • Move container from fire area if you can do it without risk. • Apply cooling water to sides of containers exposed to flames until well after fire is out. • Cool fire-exposed containers with flooding quantities of water applied from as far a distance as possible. • Stay away from ends of tanks. • Containers exposed to fire may explode or vent through pressure-relief devices. • Refer to Guide 115 of the Emergency Response Guidebook (Transport Canada/US Dept. of Transportation). | |
| <p>Unusual Fire and Explosion Hazards:</p> <ul style="list-style-type: none"> • The highly flammable vapors are heavier than air and may accumulate in low areas and /or spread along ground to distant ignition sources and flash back. | |

6. Accidental Release Measures

Protective Equipment:

Gloves: Recommended: neoprene and nitrile.
 Not recommended: polyvinyl chloride PVC.

Clothing: Flame-retardant coverall e.g. Nomex, Proban. Protective apron and trousers worn over coveralls for handling liquefied propane.

Respirator: NIOSH Approved Supplied-Air Respirator or SCBA where large propane concentration is anticipated, and the exposure level is unknown or where an oxygen-deficient atmosphere may exist.

Eye: Safety glasses with side shields, safety goggles or face shields.

Large spills: wear full protective clothing and NIOSH-approved SCBA with full face-piece.

Precautions:

- Direct addition of water to liquefied gas will cause flash vaporization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapor explosion (BLEVE)".
- Do not breathe vapors.
- Do not touch spilled liquefied propane with bare skin to avoid frostbite/freeze burn.
- Liquefied propane is still highly flammable: must be kept from sparks, open flame, hot surfaces, and all sources of ignition and heat.
- The highly flammable vapors are heavier than air and may accumulate in low areas and /or spread along ground to distant ignition sources and flash back.

Emergency Procedures:

- Shut off leak/release source, if it can be done safely.
- Remove all sources of ignition.
- Isolate hazard area.
- Evacuate area of all unnecessary personnel.
 Small spill: will evaporate.
 Large spill: consider downwind evacuation of at least 800 meters (½ mile.)
 If tank, rail car or tank truck is involved in a fire, ISOLATE and consider initial evacuation in all directions for 1600 meters (1 mile).
- Keep unnecessary and unprotected personnel from entering.
- Emergency personnel must wear appropriate personal protective equipment.
- Ventilate area of leak or spill.
- If possible, turn leaking LPG containers so that gas escapes instead of liquid.

Containment and Clean-up:

- Use non-sparking tools and equipment.
- Contain and recover liquid if it can be done safely: Collect spillage with an inert material (e.g., vermiculite, dry sand, earth), and place in metal container which can be grounded.
- Do not use combustible materials, such as sawdust, as absorbent.
- If a leak or spill has not ignited, use water spray to disperse the vapors or divert vapor cloud draft. Do not direct water at spill or source of leak.
- Prevent vapors or LPG from spreading to sewers, ventilation systems, confined spaces.
- Dispose of contents/container in accordance with applicable local, provincial/state, and federal regulations.
- Refer to Guide 115 of the Emergency Response Guidebook (Transport Canada/US Dept. of Transportation).

7. Handling and Storage

Handling Precautions :

- Use only outdoors or in a well-ventilated area..
- Keep away from heat/sparks/open flames/hot surfaces – No smoking.
- Do not breathe vapors.
- Do not eat, drink or smoke when using this product.
- Use non-sparking tools and equipment.
- Wear protective gloves/ protective clothing/ eye protection/ face protection when handling liquefied propane.
- Odor Fade: skunky-odored ethyl mercaptan was added to odorless propane as a warning agent. However ethyl mercaptan can chemically react and/or be absorbed by other materials (e.g. water/moisture, porous materials such as concrete, or rust inside tank or cylinder) resulting in the propane essentially deodorized.

Storage Precautions:

Locations

- Store in a cool, dry, well-ventilated location, away from any area of fire-hazard.
- Outside or detached storage is preferred.
- Storage and use areas should be No Smoking areas.
- Store locked-up.

Containers

- Keep container tightly closed.
- Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death

Other precautions

- Separate from incompatibles like oxidizers e.g. chlorine gas and oxygen.

8. Exposure Controls / Personal Protection

EXPOSURE LIMITS

| | Authority | 15 MINS STEL or Ceiling | 8-HOURS |
|----------------------------------|---|---|------------------------------------|
| Propane (CAS 74-98-6) | OSHA PEL | - | 1000 ppm (1800 mg/m ³) |
| | ACGIH TLV | Identified as an asphyxiant | |
| | NIOSH | - | 1000 ppm (1800 mg/m ³) |
| | IDLH: 2100 ppm Because L.P.G. may cause asphyxia at concentrations well above the lower explosive limit (LEL), the revised IDLH for L.P.G. is 2,000 ppm based strictly on safety considerations (i.e., being about 10% of the LELs of 1.9% for butane and 2.1% for propane). | | |
| Ethane (Alkane) | OSHA PEL | - | |
| | ACGIH TLV | Limits withdrawn. Instead, refer to "Minimal Oxygen Content" Appendix F of ACGIH* | |
| | NIOSH | - | |
| Butane (all isomers) | OSHA PEL | - | - |
| | ACGIH TLV | 1000 ppm (2370 mg/m ³) | - |
| | NIOSH | - | 800 ppm (1900 mg/m ³) |
| Ethyl Mercaptan (CAS 75-08-1) | OSHA PEL | 10 ppm (25 mg/m ³) ceiling | - |
| | ACGIH TLV | - | 0.5 ppm (1.3 mg/m ³) |
| | NIOSH | 0.5 ppm (1.3 mg/m ³) 15-min ceiling | - |



ENGINEERING CONTROLS

- Ventilate area where product is used, stored and/or handled to maintain airborne concentrations below the LEL and OEL, especially in confined spaces.
- Exhaust/ventilate to the outside.
- Ventilation equipment must be explosion proof.
- Ventilation system should be grounded and separate from other exhaust ventilation systems. Adequate make-up air must be provided.



PERSONAL PROTECTIVE EQUIPMENT

- Gloves: Recommended: neoprene and nitrile;
Not recommended: polyvinyl chloride PVC..
- Clothing: Flame-retardant coverall e.g. Nomex, Proban. Protective apron and trousers worn over coveralls for handling liquefied propane.
- Respirator: NIOSH Approved Supplied-Air Respirator or SCBA where large propane concentration is anticipated, and the exposure level is unknown or where an oxygen-deficient atmosphere may exist.
- Eye: Safety glasses with side shields, safety goggles or face shields.

9. Physical and Chemical Properties

| | | |
|--|--|--|
| Chemical Formula: C ₃ H ₈ or CH ₃ CH ₂ CH ₃ | Molecular Weight: 44.10 g/mole | Chemical Family: Hydrocarbon |
| Appearance: Colorless gas | Odor: Skunk-like odor from addition of ethyl mercaptan | Odor Threshold: 0.76 ppb (ethyl mercaptan) |
| Odor Fade: skunky-odored ethyl mercaptan was added to odorless propane as a warning agent. However ethyl mercaptan can chemically react and/or be absorbed by other materials (e.g. water/moisture, porous materials such as concrete, or rust inside tank or cylinder) resulting in the propane essentially deodorized. | | |
| pH: Not applicable | Melting/Freezing Point: -189.7°C (-309.5°F) | Boiling Point: -42.1°C (-43.8°F) |
| Flash Point: -104°C (-156°F) Closed Cup | Flammability: Yes | Evaporation Rate: >1 (Butyl Acetate = 1) |
| Upper-Lower Explosive Limit: 2.1% (LEL), 10.0% (UEL) | Vapor Pressure: ~ 1303 kPa @ 37.8°C (100°F) (9774 mm Hg) | Vapor Density: 1.52 (air = 1) |
| Density: Gas: 1.91 kg/m ³ @ 15°C (59°F) Liquid: 500-580 kg/m ³ (36.2 lb/ft ³) | Soluble in water (@ 20°C): Slightly soluble: 0.024-0.061 g/L | Percent Volatile: 100 by volume |
| Partition Coefficient n-octanol/water: 2.3 | Auto-Ignition Temperature: 470°C (878°F) | Decomposition Temp.: Not available |
| Viscosity: Not available | Henry's Law Constant: Not available | Isobaric Heat Capacity: Not available |

10. Stability and Reactivity

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| Reactivity: Avoid incompatible materials: may react violently with oxidizers. |
| Chemical Stability: Stable under normal temperatures and pressures. |
| Possibility of Hazardous Reactions: Polymerization has not been reported to occur under normal temperature and pressure conditions. |
| Conditions to Avoid: Extreme temperatures and incompatible materials. |
| Incompatible Materials: <ul style="list-style-type: none"> • <u>Oxidizers</u>: may react violently with oxidizers including chlorine gas and oxygen. |
| Hazardous Decomposition Products: <ul style="list-style-type: none"> • No decomposition if stored and applied as directed. • Combustion forms carbon monoxide, carbon dioxide, irritating and toxic fumes/gases. |

11. Toxicological Information

| Exposure Route | Acute Health Effects | Symptoms of Exposure |
|--------------------|---|---|
| Inhalation: | Effects on the Central Nervous system (CNS) may range from mild (respiratory depression) to severe effects (asphyxiation) | may range from rapid breathing, dizziness to respiratory arrest, loss of consciousness (narcosis) and death in extreme cases. |
| Skin: | In gas form: no known effects. | - |
| | In liquid form: burn or frostbite. | numbness, cold or burning sensation, white, pale, greyish-yellow or red skin, blistering in severe cases. |
| Eye: | In gas form: no known effects. | - |
| | In liquid form: burn or frostbite. | numbness, cold or burning sensation, blistering to blindness in severe cases. |
| Ingestion: | Not expected to be a route of exposure. | |

Chronic Exposure:

Inhalation:

Repeated or prolonged exposure may cause damage to the central nervous system (CNS), the nervous and the heart system.

Skin:

Not known to be a skin-sensitizer. Repeated and prolonged contact may cause dry, red, cracked skin (dermatitis).

Medical Conditions Aggravated by Exposure:

Possibly asthma.

| | | | |
|--|---------------------------------------|---|----------------------------|
| Sensitization: No | Reproductive Toxicology: No | Teratogenicity: No | Mutagenicity: No |
| Carcinogenicity: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA. | Irritancy: No. | Target Organs: Single exposure: central nervous system (CNS), Heart. Repeated exposure: no data available. | |

Lethality Tests:

| Chemical Name | CAS No. | LC50 | |
|-------------------------------|----------|---|--|
| Ethane | 74-84-0 | Rat, inhalation: 658 mg/L 4 hrs. | |
| Propane | 74-98-6 | Rat, inhalation: >800000ppm, 15-mins (oxygen was also added to maintain a level of ~20vol%) | |
| | | Rat, inhalation: 658 mg/L 4hrs. | |
| n-Butane | 106-97-8 | Rat, inhalation: 658 mg/L 4hrs. | |
| Isobutane | 72-28-5 | Rat, inhalation: 658 mg/L 4hrs. | |
| Ethyl Mercaptan (Ethanethiol) | 75-08-1 | LC50 | LD50 |
| | | Rat, inhalation: 2770 ppm/4hr. Mouse, inhalation: 4420 ppm/4hr | Rat, ip: 226 mg/kg Rat, oral: 682 mg/kg |

12. Ecological Information

| | |
|--|---|
| Persistence & Degradability: Not expected to persist in the environment. | Bioaccumulative Potential: No. |
| Mobility: No data available. | Other Adverse Effects: See below. |

Terrestrial Fate:

- Photolysis and hydrolysis are not expected to be important in soil.
- Not expected to bioaccumulate.
- Propane is readily degraded by soil bacterium; within 24 hr. propane was oxidized to acetone.
- Volatilization from soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 7.07×10^{-1} atm-cu m/mole. Groundwater contamination is not expected.

Aquatic Fate:

- Propane is only slightly soluble in water. Spills will spread on the water surface and the majority will evaporate. Estimated volatilization half-lives for a model river and model lake are 41 min and 2.6 hours, respectively.
- Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions.
- Propane is not listed as a marine pollutant by DOT (49 CFR Part 171).

Atmospheric Fate:

- If released to air, a vapor pressure of 7,150 mm Hg at 25°C indicates propane will exist solely as a gas in the atmosphere.
- Propane is not expected to be susceptible to direct photolysis by sunlight, but will be degraded in the atmosphere by reacting with hydroxyl radicals; the half-life for this reaction in air is estimated to be 14 days.
- Propane also has the potential to partake in photochemical reactions to produce ozone pollutant at ground level.
- Propane does not contain any Class I or II ozone-depleting chemicals (40 CFR Part 82).

Eco Toxicity Tests:

- Not available.

13. Disposal Considerations

Waste Disposal:

- Dispose of waste material at an approved waste treatment/disposal facility in accordance with applicable local, provincial, and federal regulations.
- Excess/waste propane can be disposed by incineration in a waste gas incinerator or flare.
- Propane can also be reused as fuel for boilers and heaters.

14. Transport Information

DOT (U.S.) CLASSIFICATION

PROPER SHIPPING NAME: Propane
CLASS: 2.1
PACKING GROUP: None

UN NUMBER: UN1978
LABEL/PLACARD:



OR
 (domestic transport only)

PROPER SHIPPING NAME: Liquefied Petroleum Gas
CLASS: 2.1
PACKING GROUP: None

UN NUMBER: UN1075
LABEL/PLACARD:



OR

PROPER SHIPPING NAME: Liquefied Gas, Flammable, N.O.S. (Propane)
CLASS: 2.1
PACKING GROUP: None

UN NUMBER: UN3161
LABEL/PLACARD:



MARINE POLLUTANT: No.

15. Regulatory Information

UNITED STATES

| Regulatory List | Chemical |
|---|-----------------------------|
| TSCA: Toxic Substance Control Act Inventory List | Ethane, Propane, iso-Butane |
| CCA: Clean Air Act – Accidental Release Prevention – Flammable Substances (1000 lb. threshold quantity) | Ethane, Propane, iso-Butane |

16. Other Information

NFPA Hazard Rating:
Health 1, Flammability 4, Instability 0



Prepared for: Keyera Health and Safety
Issue Date/ Revision No: January 31, 2015/ Revision #2

| Revisions: | Dates: | Main Changes |
|-----------------------------|------------------|---------------------|
| • Original: | January 3, 2011 | |
| • 1 st revision: | January 31, 2014 | Reformat |
| • 2 nd revision: | January 31, 2015 | US GHS format |

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~ End of Safety Data Sheet ~