Chemical Profiles

Propane

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What are other names or identifying information for propane?

CAS Registry No.: 74-98-6
Other names: Dimethylmethane, n-Propane, Propyl hydride, Liquefied propane
Main Uses: Fuel, refrigerant, aerosol propellant, solvent.
Appearance: Colourless gas.
Odour: Odourless in its natural state; therefore has POOR warning properties. An odourant such as mercaptan (rotten-egg smell) is used in most applications.

NOTE: Equipment containing propane may be contaminated with Naturally Occurring Radioactive Material (NORM) in the form of lead 210.

Canadian TDG: UN1978

What is the WHMIS classification?

According to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), propane can be classified as:

Flammable gases - Category 1

Gases under pressure - Liquefied gas

The signal word is danger.

The hazard statements are:

- Extremely flammable gas
- Contains gas under pressure; may explode if heated

Please note that this classification was retrieved from the CNESST site on February 22, 2023 and was established by CNESST personnel to the best of their knowledge based on data obtained from scientific literature and it incorporates the criteria contained in the *Hazardous Products Regulations* (SOR/2015-17). It does not replace the supplier's classification which can be found on its Safety Data Sheet.

What are the most important things to know about propane in an emergency?

Emergency Overview: Colourless gas. Odourless or an odourant is added. EXTREMELY FLAMMABLE GAS. Distant ignition and flashback are possible. CONFINED SPACE HAZARD. Can accumulate in hazardous amounts in low-lying areas especially inside confined spaces. COMPRESSED GAS. Contains gas under pressure. May explode if heated. ASPHYXIANT. High concentrations can displace oxygen in the air and cause suffocation. May cause frostbite.

What are the potential health effects of propane?

Main Routes of Exposure: Inhalation.

- **Inhalation:** Low concentrations are not harmful. A high concentration can displace oxygen in the air. If less oxygen is available to breathe, symptoms such as rapid breathing, rapid heart rate, clumsiness, emotional upsets and fatigue can result. As less oxygen becomes available, nausea and vomiting, collapse, convulsions, coma and death can occur. Symptoms occur more quickly with physical effort. Lack of oxygen can cause permanent damage to organs including the brain and heart. At high concentrations: can harm the nervous system. Symptoms may include headache, nausea, dizziness, drowsiness and confusion. Can cause irregular heartbeat.
- **Skin Contact:** Not irritating. Direct contact with the liquefied gas can chill or freeze the skin (frostbite). Symptoms of mild frostbite include numbness, prickling and itching. Symptoms of more severe frostbite include a burning sensation and stiffness. The skin may become waxy white or yellow. Blistering, tissue death and infection may develop in severe cases.
- **Eye Contact:** Not irritating. Direct contact with the liquefied gas can freeze the eye. Permanent eye damage or blindness can result.
- **Ingestion:** Not a relevant route of exposure (gas).
- **Effects of Long-Term (Chronic) Exposure:** Not harmful.
- **Carcinogenicity:** Not a carcinogen.
    - International Agency for Research on Cancer (IARC): Not specifically evaluated.
    - American Conference for Governmental Industrial Hygienists (ACGIH): Not specifically designated.
- **Teratogenicity / Embryotoxicity:** Not known to harm the unborn child.
- **Reproductive Toxicity:** Not known to be a reproductive hazard.
- **Mutagenicity:** Not known to be a mutagen.

What are first aid measures for propane?

Inhalation: Take precautions to prevent a fire (e.g., remove sources of ignition). In case of oxygen deficiency: take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment). Move victim to fresh air. Keep at rest in a position comfortable for breathing. If breathing is difficult, trained personnel should administer emergency oxygen. If the heart has stopped, trained personnel should start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Skin Contact: Not applicable (gas). Liquefied gas: quickly remove victim from source of contamination. DO NOT attempt to rewarm the affected area on site. DO NOT rub area, flush with water, or apply direct heat. Carefully cut around clothing that sticks to the skin and remove the rest of the garment. Do not remove frozen clothing from frostbitten areas. Loosely cover the affected area with a sterile dressing. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Eye Contact: Not applicable (gas). Liquefied gas: move victim to fresh air. Immediately flush with gently flowing water, occasionally lifting the upper and lower eyelids. DO NOT attempt to rewarm. Cover both eyes with a sterile dressing. DO NOT allow victim to drink alcohol or smoke. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Ingestion: Not applicable (gas).

First Aid Comments: Some of the first aid procedures recommended here require advanced first aid training. All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

What are fire hazards and extinguishing media for propane?

Flammable Properties: EXTREMELY FLAMMABLE GAS. Can easily ignite. Can readily form explosive mixture with air at room temperature.

Suitable Extinguishing Media: Dry chemical powder and high-expansion foam. Foam manufacturers should be consulted for recommendations regarding types of foams and application rates.

Unsuitable Extinguishing Media: DO NOT use carbon dioxide, low expansion foams, and direct application of water on liquefied gas.

Specific Hazards Arising from the Chemical: Gas or vapour may travel a considerable distance to a source of ignition and flash back to a leak or open container. Gas or vapour may accumulate in hazardous amounts in low-lying areas especially inside confined spaces, resulting in a health hazard. Can displace oxygen in the air, causing suffocation. Direct addition of water to liquefied gas will cause flash vapourization resulting in an explosion (either immediately or delayed) known as a "boiling liquid, expanding vapour explosion (BLEVE)". Heat from fire can cause a rapid build-up of pressure inside cylinders. Explosive rupture and a sudden release of large amounts of gas may result. Cylinder may rocket. In a fire, the following hazardous materials may be generated: very toxic carbon monoxide, carbon dioxide.

What are the stability and reactivity hazards of propane?

- **Chemical Stability:** Normally stable.
- **Conditions to Avoid:** Open flames, sparks, static discharge, heat and other ignition sources.
- **Incompatible Materials:** Increased risk of fire and explosion on contact with: oxidizing agents (e.g., peroxides), halogens (e.g., chlorine). Not corrosive to: aluminum alloys, carbon steel.
- **Hazardous Decomposition Products:** None known.
- **Possibility of Hazardous Reactions:** None known.

What are unintentional release measures for propane?

Personal Precautions: Evacuate the area immediately. Isolate the hazard area. Keep out unnecessary and unprotected personnel. Evacuate downwind locations. Eliminate all ignition sources. Use grounded, explosion-proof equipment. Distant ignition and flashback are possible. Monitor area for flammable or explosive atmosphere. Before entry, especially into confined areas, check the atmosphere with an appropriate monitor. Test for sufficient oxygen levels.

Methods for Containment and Clean-up: If possible, turn the leaking container so that gas escapes rather than liquefied gas. Contact emergency services and manufacturer/supplier for advice.

Other Information: Contact supplier, local fire and emergency services for help. Report spills to local health, safety and environmental authorities, as required.

What handling and storage practices should be used when working with propane?

Handling: Eliminate heat and ignition sources such as sparks, open flames, hot surfaces and static discharge. Post "No Smoking" signs. Only use where there is adequate ventilation. Immediately report leaks, spills or failures of the safety equipment (e.g., ventilation system). In the event of a spill or leak, exit the area immediately. Never work on pressurized system. Use piping and equipment designed for high pressures and cold temperatures. Isolate and purge all equipment, piping or vessels prior to maintenance or repairs.

NOTE: Equipment containing propane may be contaminated with Naturally Occurring Radioactive Material (NORM) in the form of lead 210. If NORM is present, precautions to prevent inhalation, skin contact and ingestion should be taken when opening, or cleaning or doing repair work on the inner surfaces of this equipment.

Storage: Store in an area that is cool, well-ventilated, out of direct sunlight and away from heat and ignition sources. An approved, fire-resistant area. Separate from incompatible materials. (e.g., oxygen, chlorine gases) On the ground floor or preferably, in an isolated, detached building. Clear of combustible and flammable materials (e.g., old rags, cardboard). Electrically bond and ground containers. Ground clips must contact bare metal. Always secure (e.g., chain) cylinders in an upright position to a wall, rack or other solid structure. Avoid bulk storage indoors.

What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for propane?

ACGIH® TLV® - TWA: Simple asphyxiant*; Explosion hazard**

Exposure Guideline Comments: No specific TLV® = Threshold Limit Value. TWA = Time-Weighted Average.

*Minimal oxygen content required.

**Propane is a flammable asphyxiant. Excursions above the TLV could approach 10% of the lower explosive limit.

Adapted from: 2022 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on Canadian Governmental Occupational Health & Safety Departments.

A list of which acts and regulations that cover exposure limits to chemical and biological agents is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

What are the engineering controls for propane?

Engineering Controls: General ventilation is usually adequate. Do not allow product to accumulate in the air in work or storage areas, or in confined spaces. For large scale use of this product: use stringent control measures such as process enclosure to prevent product release into the workplace. Use non-sparking ventilation systems, approved explosion-proof equipment and intrinsically safe electrical systems in areas where this product is used and stored. Use leak and fire detection equipment and an automatic fire suppression system. Provide safety shower in work area, if contact or splash hazard exists.

What Personal Protective Equipment (PPE) is needed when working with propane?

Eye/Face Protection: Not required if product is used as directed.

Skin Protection: Protect exposed skin using insulated gloves suitable for low temperatures, long sleeves, protective apron and trousers worn outside boots or over shoes. Wear appropriate foot protection when handling cylinders. Suitable materials include: nitrile rubber, neoprene rubber, Tychem® 10000 FR, Zytron® 500.

Not recommended: polyvinyl chloride- PVC. Recommendations are NOT valid for very thin neoprene rubber and nitrile rubber gloves (0.3 mm or less).

Respiratory Protection:

Up to 2100 ppm:
(APF = 10) Any supplied-air respirator
(APF = 50) Any self-contained breathing apparatus with a full facepiece

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the NIOSH Pocket Guide to Chemical Hazards for more information.

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