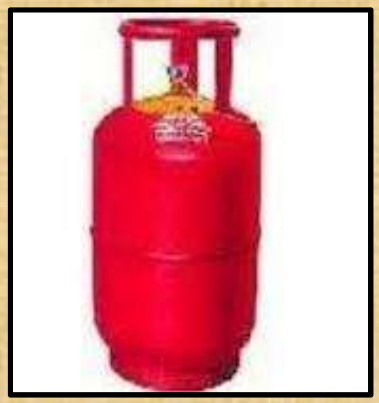
LPG

HAZARDS AND SAFETY MEASURES

PROPERTIES

- Appearance: Colourless, Odourless gas at room temperature.
- To detect gas leak, an odorant is added to the gas for early detection.
- Composition (approx.): 45 % Propane + 55% Butane
- Boiling Point: -42 ° C
- Flashpoint: -104 - 60° C
- Flammability Limits: (In air) 1.8% – 9.5%
- Relative Density: (Air = 1): 1.47 – 2.08
- Density of Gas: (101.3 kPa, 15°C): 1.80 - 2.55 kg/m3
- Molecular Weight: 42 - 58



Properties and hazards of LPG

- LPG is colourless and its density as a liquid is approximately half that of water. If LPG is spilt on water, it will float on the surface before vaporising. The liquid has approximately **1 /250th** of the gas volume.

- The gas or vapour is at least 1.5 times as dense as air and does not disperse easily. It will tend to sink to the lowest possible level and may accumulate in cellars, pits, drains or other depressions.
- LPG forms flammable mixtures with air in concentrations of between approximately 1.8% and 9.5%. It is a fire and explosion hazard if stored or used incorrectly.

- If LPG escapes into a confined space and is ignited, an explosion could result. If an LPG vessel is involved in a fire, it may overheat and rupture violently giving an intensely hot fireball and may project pieces of the vessel over considerable distances.

Properties and hazards of LPG

- Vapour/air mixtures arising from leakage or other causes may be ignited some distance from the point of escape, and the flame travel back to the source.

- At very high concentrations, when mixed with air, LPG vapour is anaesthetic and subsequently an asphyxiant by diluting or decreasing the available oxygen.

- LPG is normally odorised before distribution so that is has a characteristic smell which can easily be recognised. This enables detection by smell of the gas at concentrations down to one fifth of the lower limit of flammability (approximately 0.4% of the gas in air).
- Significant leaks may also be detected by a hissing sound or by icing in the area of the leak. Small leaks may be detected by brushing the suspect areas with a detergent/water mixture where bubbles will form at the leak. *On no account should a naked flame or other source of ignition be used to detect a leak.*

Properties and hazards of LPG

- A vessel which has held LPG and is nominally empty may still contain LPG in vapour form and be potentially dangerous. In this state the internal pressure is approximately atmospheric and, if a valve is leaking or left open, air can diffuse into the vessel forming a flammable mixture and creating a risk of explosion. LPG will also be displaced to the atmosphere.

- LPG can cause severe cold bums to the skin owing to its rapid vaporisation and the consequent lowering of temperature. Vaporisation of LPG can also cool equipment to the extent that it may be cold enough to cause cold bums. Protective clothing such as gloves and goggles should be worn if this cooling is likely to occur.

Health Effects

Swallowed: Not applicable due to high evaporation rate.

Eye: Moderate irritation from vapour. Irritation and possible freezing if liquid enters the eye.

Skin: Liquid can cause irritation and frostburn if in contact with skin.

Inhaled: May cause irritation to respiratory tract. Moderate exposure may cause headaches or dizziness.

Elevated exposure may cause unconsciousness and respiratory arrest by diluting the oxygen concentration in air below the level necessary to support life; it can act as an ***asphyxiant***.

Chronic: Long term exposure to LPG has no known health effects. Prolonged exposure to an oxygen deficient atmosphere (below 19% oxygen in air) may affect the heart and nervous system.

First Aid: Inhalation

In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Remove victim to uncontaminated area whilst wearing self-contained breathing apparatus. Victim may not be aware of asphyxiation. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

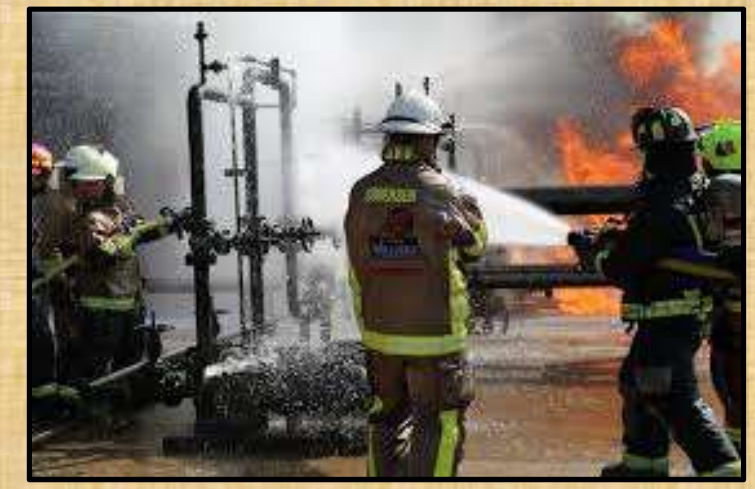
Advice to Doctor: Advise doctor that victim has been exposed to an oxygen deficient atmosphere.

General: Rescuers should not enter an oxygen deficient atmosphere without using self-contained full face positive pressure breathing equipment. Rescue personnel should be aware of extreme fire hazard associated with L.P.G. rich atmospheres.

Personal Protection

Personnel engaged in the movement of cylinders shall be provided with safety footwear, safety glasses and leather or PVC gloves.

Full cover overalls are recommended.



In areas where equipment failure may cause an immediate high concentration of LPG, ensure adequate ventilation and have approved self-contained, full face respiratory equipment readily available for emergencies.

Spills and Disposal: Ventilate area. Stop leak if it can be done without risk. Allow gas to dissipate to atmosphere. Prevent from entering sewers, basements and work pits, or any place where its accumulation can be dangerous.

Storage

- Storage of compressed gas cylinders shall be in compliance with *Gas Cylinder Rule,2004.*
- Cylinders will be kept away from ignition sources (including static discharges).
- Cylinders shall be stored in a cool, dry, well-ventilated area out of direct sunlight and away from heat and ignition sources.
- No part of cylinders shall be exposed to temperatures above 50°C.
- Cylinders shall be stored upright on a level, fireproof floor, secured in position and protected from damage.
- Full cylinders shall be stored separately from empties.
- Cylinders should be moved by hand-truck or cart designed for that purpose.

EXPOSURE CONTROLS

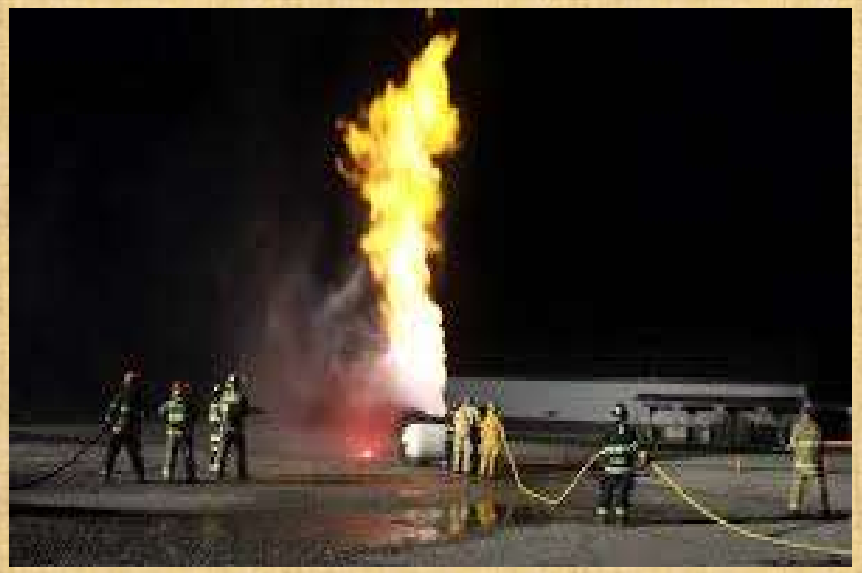
Exposure Standards: TWA 1000 ppm v/v

Engineering Controls:

- Provide ventilation to area of use to prevent accumulation of L.P.G. at flammable concentrations.
- Provide adequate local exhaust and dilution (general) ventilation and supply sufficient replacement air to maintain oxygen concentration above 19%.

FIRE FIGHTING MEASURES

- Cool cylinders by spraying flooding quantities of water from a protected location.
- If unable to keep cylinders cool, evacuate area, minimum distance 200 meters.
- Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire.
- Exposure to fire may cause container to rupture/explode. Cylinders involved in a fire/explosion may rocket.
- Move cylinders from vicinity of fire if safe to do so.
- **Extinguishing Media:** Water, DCP, Carbon di oxide



Operational procedures for bulk storage

- Written operating procedures should be prepared which clearly define the actions or functions required of people involved.
- These should cover both normal and emergency operations and be regularly reviewed to ensure that they are appropriate at all times.
- They should be amended to take into account any alterations or modifications to the installation.
- The procedures should be readily available and preferably clearly displayed.
- Copies or relevant abstracts should be issued to people on site., including contractors entering or working at the site.

Operational procedures for bulk storage

Procedures(Requiring written instruction) should include:

- The transfer of LPG to or from the installation (for which check lists may prove a useful supplement)
- The transfer of LPG at other sites when delivery tankers operate from the site.
- Permit-to-work systems.
- Plant maintenance and modification including the maintenance of protected electrical equipment.
- Emergency procedures.

THAN YOU