

# Safety Data Sheet

## 1. Identification of the chemicals and of the business entity

Chemicals Name: PRESSURIZED LPG MIXTURE
Other Names: C3 /C4 LPG 、 Pressurized LPG Mixture-iso-Butane rich
Recommended use and restrictions on use: Fuel for jet propulsion engine, household and industrial use fuel
Names, addresses, and phone numbers of manufacturer, importer or supplier: Formosa Petrochemical Corporation No.201 Tung-Hwa N. Rd, Taipei City 0800-060-088
Emergency contact phone numbers/fax numbers:05-681-5627 FAX 05-681-1042

## 2. Hazard(s) identification

Chemicals hazard classification: Flammable Gas Level 1, High pressure gas
Label content: Symbol sign: Flame, High-pressure Steel Cylinder Warning Alert :Danger Hazard warning messages: <div style="text-align: center;"></div> <p>Highly flammable gas High pressure gas inside; may explode when heated</p>
Hazard precautions: Strictly prohibited of fire and prevent the buildup of static Place container at a well ventilated site Can be only used at a well ventilated area
Other hazards: -

## 3. Composition/information on ingredients

### Mixtures:

Chemical properties:	
Chinese and English names of the hazardous ingredients	Concentration or concentration ranges (ingredient percentage)
<b>LPG 68476-85-7</b>	100%

## 4. First-aid measures

<p>First aid methods for different exposure pathways:</p> <p>Inhalation: Immediately move the victim away from the site, move to a cool, quiet, and well ventilated area. Use a blanket to keep the person warm. If the victim has breathing difficulty or has stopped, immediately give artificial respiration or provide oxygen with an oxygen respirator to prevent the brain lack of oxygen. Also seek medical attention immediately</p> <p>Skin contact: Flush affected area with lukewarm water (do not use hot water if causing frostbite) . If there is no lukewarm water then wrap the area with a blanket or heavy clothes. Wait until warm and encourage the person to move slowly to enable blood circulation. Seek medical attention immediately if there is anything unusual.</p> <p>Eye contact: Rinse the eyes immediately with lukewarm water at least for 15 minutes, and continuously hold open the upper and lower eyelids. A sterilized dry swab can be used to gently wrap, and immediately see an ophthalmologist for further first aid.</p> <p>Ingestion: Not suitable</p>
<p>Most important symptoms and hazardous effects: Irritation, breathing difficulty, vomiting, headache, dizziness etc. Tranquilizer and asphyxiant for the central nervous system. High volatile liquid which will cause frostbite of the eyes and skin with direct contact</p>
<p>Protection for first-aid providers: Move the victim to a safe place to provide safe aid, and take notice if there is any danger of fire causing explosion</p>
<p>Notes to physicians:Oxygen can be considered to use to assist breathing for inhaling toxication</p>

## 5. Firefighting measures

<p>Suitable fire extinguishing media:Dry chemical powder, carbon dioxide, water spray, foam</p>
<p>Specific hazards regarding firefighting measures:</p> <ol style="list-style-type: none"> <li>(1)If there are any flammable gases at the fire scene, the flowing of the gases should be first stopped before fire-extinguishing.</li> <li>(2)The gas can form explosive mixings or re-ignited. If possible allow the fire to burnout</li> <li>(3) Separate substances that have not caught fire and protect personnels</li> <li>(4) Explosion might occur for the containers at the fire scene, use water sprays to cool down</li> <li>(5)Fires of storage tanks or gas tank vehicles will cause boiling liquid expansion and vapor explosion. Avoid explosion fragments injury</li> </ol>
<p>Specific methods regarding firefighting measure:</p> <ol style="list-style-type: none"> <li>(1) If there is no danger, move the storage containers away from the fire scene or separate from other flammable substances. Cool down the containers with fire-extinguishing water until the flames are totally extinguished. Personnels should stay away from the tail end direction of the containers.</li> <li>(2)Burning of gaseous fires is extremely fast. If there is gas leakage from the container or pipes and have caught on fire, by principle it is not immediately extinguished but should first attempt to cut off or close the gas source (if cannot be cut off, the</li> </ol>

burning is kept, but should use fire-extinguishing water to cool down and protect the container itself and nearby equipments) to prevent when the gas cannot be cut off, large amounts of gas shall leak and from a highly ignited gas mixture which can cause even a greater disaster

- (3) Attempt to pump out the gas and liquid within the container, and send it to a safe place
- (4) Use automatic or fixed fire fighting equipment until the flames are totally extinguished
- (5) Use fire-extinguishing water to cool down and protect the container itself and nearby equipments
- (6) Separate the controlled area, control the entering of personnel
- (7) If the safety valve is discovered of sounding the alert siren or the storage tank changes color, rescuers should immediately evacuate with a radius more than 800 meters
- (8) Fire fighters should wear overall air respirator equipment under high toxic gas concentrations

Special protective equipment and precautions for firefighters:

Fire fighters must be equipped with one-piece chemical protection clothing, air respirator device (addition of an anti-flash aluminum coat when necessary)

## 6. Accidental release measures

Personal precautions: (1) Restrict personnels approaching near the area when the contaminated area is not completely cleaned (2) Make sure the personnels in charge of the cleaning were trained (3) Appropriate personal protection equipment must be worn to enter the leakage area. If there is liquid inside the equipment do not directly touch the leakage liquid as it can cause frost-bite

Environmental precautions:

- (1) Ventilate and change air of the leakage area
- (2) Remove all ignition sources
- (3) If safe conditions are allowed, attempt to stop the leakage
- (4) Use water fog or water spray to reduce vapor amount

Methods for cleaning up:

- (1) Remove all ignition sources
- (2) Seal the contaminated area, evacuate nearby personnel
- (3) Water spray the area to reduce the vapor concentration within the air
- (4) During a leakage rescuers must wear positive pressure type overall self-carrying respiratory protective device. Other personnel immediately leave the site
- (5) Fire is strictly prohibited of areas nearby the disaster area
- (6) Conduct efficient ventilation at the leakage area, stop the leakage gas source, take aware of the igniting concentration

## 7. Handling and storage

Handling:

- (1) PRESSURIZED LPG MIXTURE is a flammable gas and obtained from pressurization. Engineering control and protection equipment are required. Work personnel should be appropriately trained and informed the hazard and safe using

methods

- (2) Extinguish all ignition sources (such as sparks, flames, hot surfaces) and keep away from heat and welding operation
- (3) Transfer operations, steel-cylinders and containers should be grounded and conected with the same electrical potential
- (4) Smoking is prohibited
- (5) Remove any other flammable substances within the operation area
- (6) Avoid releasing gases into the air of the working area
- (7) Do not use with incompatible substances
- (8) For large disposal and storage, use ventilate equipment that does not create sparks, approved explosive protection equipment, and safe electric control systems
- (9) Install leakage detection and alarm devices and appropriate auto fire-extinguishing systems
- (10) Operate with a minimal amount under a well ventilated area, wear self-protective equipment and separate from the operating area
- (11) The steel-cylinder should be vertically placed on the ground and mounted to a wall or a pillar. Avoid grabbing, covering, and holding up the steel cylinder.
- (12) Use a suitable pressure adjustment valve.
- (13) A check valve should be installed when using the steel cylinder, avoid gases reverse-entering the steel cylinder.
- (14) Maintain the cleanness of the steel cylinder valve, uncontaminated (water or oil). Carefully and slowly release the pressure when opening to avoid valve damage.
- (15) Inspect all new steel cylinders to see if the labels are clear and if there is any damage
- (16) The steel cylinder should be clearly labeled and prevented from damage. The valve should be opened only when in use
- (17) Move only with a special purpose trolley or hand trolley. Avoid operating with oily hands and collisions between the cylinders
- (18) Avoid grabbing, covering, and holding up the steel cylinder.
- (19) The storage area should be clearly labeled with no obstacles and only authorized or trained people may enter

Storage:

- (1) Protect the containers and pipes from collisions or damage; keep away from flammable substances
- (2) Keep storage within qualified safe containers
- (3) Storage at a cool, dry, and well ventilated site. Avoid direct sunlight, outdoor ball shaped storage tanks. Install a water spray cooling down system
- (4) Keep away from strong oxidants, heat, and ignition sources
- (5) Inspect the containers with a regular basis. Immediately repair if there are serious corrosion or leakage
- (6) The storage area should be clearly labeled with no obstacles and only authorized or trained people may enter
- (7) Inspect all new steel cylinders to see if the labels are clear and if there is any damage
- (8) Keep away from heat sources, ignition sources, and incompatible substances
- (9) Protect the surface of the steel cylinder from corrosion
- (10) Empty steel cylinders should be separately stored and labeled
- (11) PRESSURIZED LPG MIXTURE is heavier than gas and will accumulate at low-lying areas. Storage must be kept higher than ground level

- (12)Keep storage within storage tanks, closets, buildings, and rooms suitable for flammable substances
- (13)Must be equipped with fire-fighting and emergency handling equipment which can be used at any time

### 8. Exposure controls/personal protection

Engineering control:			
1. Partial gas exhaustion or overall air change equipment			
2. Use a non-spark, grounded explosion protective ventilated system and separate from other ventilation systems			
3. Directly connect the gas exhaust outlet to the outside and adopt necessary measures for environmental protection			
4. Offer sufficient fresh air to replace the drawn out exhausted gas			
Control parameters:			
Average allowable concentration in eight-hour day <b>TWA</b>	average allowable short-term concentration <b>STEL</b>	maximum allowable concentration <b>CEILING</b>	Biological indicators <b>BEIs</b>
PROPANE	1000ppm ( 1800 mg /m <sup>3</sup> )	1000ppm ( 1800 mg /m <sup>3</sup> )	No data available
BUTANE	800ppm ( 1900 mg /m <sup>3</sup> )	1000ppm ( 2375 mg /m <sup>3</sup> )	No data available
PROPYLENE	No data available	No data available	No data available
PRESSURIZED LPG MIXTURE	1000ppm ( 1800 mg /m <sup>3</sup> )	1000ppm ( 1800 mg /m <sup>3</sup> )	No data available
Biological indicators: -			
Individual safety Equipment:			
Respiratory protection:			
1. 1000 ppm and below: Air-supplying respiratory protection equipment or overall air respirator (self-carrying type respiratory protective device)			
2. For unknown concentrations or above 1000ppm: : Positive pressure, overall air respirator (self-carrying type respiratory protective device) or overall oxygen-supplying respiratory protection equipment with the aid of a positive pressure air respirator (self-carrying type respiratory protective device)			
Hand protection: Insulation gloves suitable at low temperatures, gloves with responder materials			
Eye protection: Chemical safety goggles, face protection mask, eye wash equipment			
Skin and body protection: (1) Long sleeve clothes, long pants (covering the working boots or wrapping the shoes) suitable at low temperatures (2) Body rinse and eye wash equipment are required at the working area			
Health measures:			
(1) Qualified protective equipment should be used, and check if there are any damage and change new ones on a daily basis			
(2) Do not wear contact lenses, take notice of personal health. Working clothes			

<p>should be taken off and cleaned after work.</p> <p>(3) Wash the hands and face with soap and clean water before eating. Sleeping and eating at the work site is prohibited</p> <p>(4) Take health examinations on a regular basis</p>
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#### 9. Physical and chemical properties:

Appearance: Colorless, pressured gas	Odor: Household stinking additive, similar to the smell of mercaptan from a preserved egg
Smell threshold : <b>1ppm</b> ( Detectable )	Melting point: <b>-45.6°C</b>
pH: —	Boiling point/boiling point range: <b>-40°C~-0.5°C</b>
Flammability (solid, gas): —	Flash point: <b>-100°C</b>
Decomposition temperature: -	Test method: Closed cup
Auto-ignition temperature: 405~549°C ( 761~1120°F )	Explosion limit: <b>1.8 %~ 9.0 %</b> (v/v)
Vapor pressure: 17~127psig ( 60°F )	Vapor density: <b>1.50~2.01</b> ( air=1 )
Density: : <b>0.50~0.58</b> (water=1)	Solubility: immiscible with water
Partition coefficient (n-octanol/water, logKow): 2.36	Vaporization speed: -

#### 10. Stability and reactivity

Stability: Stable under normal conditions
Possible hazardous reactions under specific conditions: <b>1.</b> Strong oxidants (such as peroxides, chlorine, and fluorine) increase the danger of fires and explosions
Conditions to avoid: Avoid heat, strictly prohibit fire and buildup of static, seclude all kinds of ignition sources
Materials to avoid: Strong oxidants, NICKEL CARBONYL, and OXYGEN
Hazardous decomposition products: Will release toxic carbon oxides through thermal degradation, such as: carbon monoxide

#### 11. Toxicological information

Routes of exposure: Skin, inhalation, eyes
Symptoms: Dizziness, acceleration in breathing and heart beat, discordant of the muscles, low mood, fatigue, breathing unevenly, nausea, vomiting, prostration, loss of consciousness, convulsions, asphyxia, frostbite or chilblains
Acute toxicity: Skin: (1) The gas has no effect to the skin (2) The liquid may cause frostbite or chilblains Inhalation: (1) Not toxic below 1,000 ppm. No symptoms occur for short exposures of 10,000 ppm (2) For gas concentration of 19,000 ppm and exposed for several minutes will cause asphyxia (3) High concentrations will drive away oxygen to

cause suffocation (4) The concentration of oxygen in the air may not be less than 18%. Symptoms of lack in oxygen are: 12~16% : Breathing and heart beat acceleration, discordant of the muscles ; 10~14% : Low mood, fatigue, unevenly breathing ; 6~10% : nausea, vomiting, prostration, loss of consciousness ; less than 6% : convulsions, asphyxia, and death

Eye: (1) The gas will not cause irritation to the eye (2) The liquid may cause frostbite or chilblains

**LD50**(animal test, absorption path) : -

**LC50**(animal test, absorption path) : 658gm/m<sup>3</sup>/4hr (rats , inhalation)

Chronic toxicity or long-term toxicity:

1. There are no reports of long-term exposure effects or causing of cancer

## 12. Ecological information:

Eco-toxicity :

**LC50** (Fish) : —

**EC50** (Water invertebrates) : —

Bioconcentration Factor (**BCF**) : —

Persistence and degradability:

1. More than 20 microorganisms were found in the samples from the lake and soil. Within **24** hours, propane was decomposed into methyl ketone, acetone and alcohols

2. The main distribution method is by vaporization when released into the water

3. When released into the atmosphere, will react with the free radicals of oxyhydrogen and nitrogen oxides

Half-life ( air ): -

Half-life ( surface water ): -

Half-life ( ground water ): -

Half-life ( soil ): -

Bioaccumulative potential:

Mobility in soil:

Main mobility is by vaporization when released into the soil

Other negative effects: -

## 13. Disposal considerations

1. Allow the gas to safely scatter in the air or use as fuel

## 14. Transport information

U.N. number: **1075**

U.N. shipping name: LPG

Shipping hazardous classification: Flammable Gases of class 2.1

Type of packaging: -

Marine pollutant ( yes / no ) : no

Specific transport measures and precautionary conditions: -

## 15. REGULATORY INFORMATION

<p>Applicable regulations:</p> <ol style="list-style-type: none"> <li>1. Occupational Safety and Health Act</li> <li>2. Enforcement Rules of the Occupational Safety and Health Act</li> <li>3. Regulations for the Labeling and Hazard Communication of Hazardous Chemicals</li> <li>4. Standards of Permissible Exposure Limits of Airborne Hazardous Substances in Workplace</li> <li>5. Road Traffic Management and Penalty Act</li> <li>6. Public Hazardous Substances &amp; Flammable Pressurized Gases Establishment Standards &amp; Safety Control Regulations</li> </ol>
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## 16. OTHER INFORMATION

Literature references	<ol style="list-style-type: none"> <li>1. CHEMINFO database , CCINFO CD-ROM</li> <li>2. HSDB database , TOMES PLUS CD-ROM</li> <li>3. RTECS database , TOMES PLUS CD-ROM</li> <li>4. OHS MSDS ON DISC , MDL Publishing Co</li> <li>5. ChemWatch database</li> </ol>	
Organization that prepared the SDS	Name: Environmental Health and Safety Group, Refinery Division, Formosa Petrochemical	
	Add/Tel: No. 15, Formosa Industrial Complex, Mailiao Village, Yunlin Country +886-5- 6815621	
Person who prepared the SDS	Title : Industry Safety Specialist	Name (signature): Kuan-Hung Chen
Date that the SDS was prepared	<b>March 2, 2022</b>	
Notation	The symbol “—” of above represents there are no related information at the present. And the symbol “ / ” represents that column is unsuitable for the substance.	