



Material Safety Data Sheet (MSDS)

Date : 2013.03.07.

Product	Liquified petroleum gas (LPG)		
CAS No.	RTECS No.	UN No.	EC No.
68476-85-7	EJ4200000	1011	203-448-7

1. Chemical Product and Company Information

1) Product

Liquified petroleum gas (LPG), Commercial Butane(C4)

(Synonyms : N-butane, LP-Gas, Normal Butane, Liquified petroleum gas (LPG))

2) Recommended use of the chemical and restrictions on use

○ Recommended use :

Avoid heat, sparks, open flames and other ignition sources

Minimize the impurity contact.

○ Restrictions on use :

If containers are exposed to heat, container damage or explosion may occur.

3) Manufacture/Supplier information

○ Supply company : GS Caltex Corporation

○ Address : 679 Yoksam-dong, Kangnam-gu, Seoul, Korea

○ Information service or emergency call : (82) 1544-5151

○ Department in charge :

2. Hazards Identification

1) Classification of the substance or mixture

Flammable gases category 1

High-pressure gas

2) GHS labels, including precautionary statements

○ Symbol



- Signal word : Danger
- Hazard statement
 - H220 Extremely flammable gas
 - H280 High-pressure gas
- Precautionary statement
 - Prevention
 - P210 Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
 - Response
 - P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
 - P381 Eliminate all ignition sources if safe to do so.
 - Storage
 - P403 Store in a well-ventilated place.

3) Other hazards which do not result in classification

- NFPA
 - Health 1
 - Fire 4
 - Reactivity 0

4) Emergency Overview

DANGER! Extremely flammable. Compressed gas. Severe fire hazard. Severe explosion hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.

3. Composition and Information on Ingredients

Component	Synonyms	CAS No.	Content(vol.%)
Propane	Liquified petroleum gas	68476-85-7	15% < Vol.
Butane	N-Butane	106-97-8	85% > Vol.
Butadiene		106-99-0	0.5% < Vol.

4. First Aid Measures

1) Eye contact

Immediately flush eyes with plenty of water for at least 20 minutes. Then get immediate medical attention.

2) Skin contact

If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105–115 F; 41–46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

3) Inhalation

If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

4) Ingestion

If a large amount is swallowed, get medical attention.

5) Most important symptoms/effects, acute and delayed

No data

6) First-aid treatment and information on medical doctors

In case of inhalation, consider the oxygen injection.

5. Fire Fighting Measures

1) Recommended(or prohibited) extinguishing media

- ☐ Recommended extinguishing media : Dry chemicals, CO₂, water spray, fire fighting foam
- ☐ Prohibited extinguishing media : No data
- ☐ Large fire : Use regular foam or flood with fine water spray.

2) Specific hazard from chemical material

- ☐ Toxicant from combustion : Carbon oxides
- ☐ Fire and Explosion Hazards: Severe fire hazard. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Vapor/air mixtures are explosive above flash point.

3) Extinguishment

Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Stop leak if possible without personal risk. Let burn unless leak can be stopped immediately. For smaller tanks or cylinders, extinguish and isolate from other flammables. Evacuation radius: 800 meters (1/2 mile). Stop flow of gas.

6. Accidental Release Measures

1) Necessary actions to protect human health

Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Stop leak if possible without personal risk. Reduce vapors with water spray. Keep unnecessary people away, isolate hazard area and deny entry. Remove sources of ignition. Ventilate closed spaces before entering.

2) Necessary actions to protect the environment

- ☐ Air : No data
- ☐ Soil : No data
- ☐ Water : No data

3) Purification and removal methods

- ☐ Small leak : Ventilate before entering the closed area.
- ☐ Large leak : Only authorized person can access the hazardous area.

7. Handling and Storage

1) Safety handling

Store and handle in accordance with all current regulations and standards. Grounding and bonding required. Keep separated from incompatible substances.

2) Storage

U.S. OSHA 29 CFR 1910. 101.

U.S. OSHA 29 CFR 1910. 110.

Keep away from prohibited materials for mixing.

8. Exposure Control and Personal Protection

1) Exposure limits and biological exposure limits of chemical

(Butane)

- ☐ ACGIH : TWA – 800ppm
- ☐ NIOSH : TWA – 800ppm, 1900mg/m³ (10hr)
- ☐ DFG MAK : 2400 mg/m³ (1000 ml/m³)

(Propane)

- ☐ OSHA : TWA – 1000ppm, 1800mg/m³
- ☐ NIOSH : TWA – 1000ppm, 1800mg/m³ (10hr)
- ☐ ACGIH : TWA – 1000ppm (as Aliphatic hydrocarbon gases(C1–C4))
- ☐ MOL : No data
- ☐ ACGIH : 1000 ppm TWA

- NIOSH : 1000 ppm TWA; 1800 mg/m³ TWA
2100 ppm IDLH (10% LEL)
- OSHA : 1000 ppm TWA; 1800 mg/m³ TWA

2) Engineering management

Ventilation equipment should be explosion-proof if explosive concentrations of dust, vapor or fume are present.

Comply with limits.

3) Personal protection equipment

- Respiratory protection :

The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
2100 ppm

Any supplied-air respirator.

Any self-contained breathing apparatus with a full facepiece.

Emergency or planned entry into unknown concentrations or IDLH conditions –

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape –

Any appropriate escape-type, self-contained breathing apparatus.

- Eyes protection :

Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

- Hands protection

Wear insulated gloves.

- Human body protection :

For the gas: Protective clothing is not required. For the liquid: Wear appropriate protective, cold insulating clothing.

9. Physical and Chemical Properties

1) Appearance	Colorless
2) Odor	faint odor
3) Odor threshold	Not available
4) pH	No data
5) Melting point/freezing point	–138 °C
6) Initial boiling point or boiling range	–0.5 °C
7) Flash point	–0.5 °C
8) Evaporation rate	Rapid (Gas at normal ambient conditions)
9) Flammability(solid, gas)	No data

10) Upper/lower flammability or explosive limits	LEL: 1.8% UEL: 8.4%
11) Vapor pressure	1.3 Mpa @ 40 °C
12) Solubility	1213.7 mmHg @ 21.1 °C
13) Vapor density	2.1 (Air=1)
14) Relative density	0.508 g/cm ³ @ 15 °C
15) Partition coefficient: n-octano/water	2.89
16) Auto-ignition temperature	365 °C
17) Decomposition temperature	No data
18) Viscosity	No data
19) Molecular weight	58.12

10. Stability and Reactivity

1) Chemical stability

Stable at room temperature and pressure.

2) Possibility of Hazardous Reactions

Will not polymerize.

3) Prohibited conditions

Avoid heat, sparks, open flames and other ignition sources

Minimize the impurity contact.

If containers are exposed to heat, container damage or explosion may occur.

4) Prohibited materials

Oxidizing materials, combustible materials

5) Toxicant during decomposition

Normal combustion produces carbon dioxide; incomplete combustion can produce carbon monoxide.

11. Toxicological Information

(N-Butane)

1) Information on the likely routes of exposure

- Inhalation : A 1% concentration for 10 minutes may cause drowsiness. Higher concentrations may cause respiratory tract irritation, headache, dullness, shortness of breath, muscular weakness and paralysis, unconsciousness, and death. Butane is a weak cardiac sensitizer in the dog. Unless an odorant is added, the lack of warning properties may make overexposure more likely. See information on LPG and simple asphyxiants.
- Ingestion : Ingestion of a gas is unlikely. If liquid is swallowed, frostbite damage to the lips, mouth and mucous membranes may occur.
- Skin contact : No effects have been reported
- Eye contact : No adverse effects have been reported from the gas. Due to rapid evaporation, the liquid may cause frostbite with redness, pain and blurred vision.

2) Delayed and immediate effects and chronic effects from short or long term exposure

- Acute toxicity
 - Oral : No data
 - Dermal : No data
 - Inhalation : LC50 Rat 658 mg/L 4 h
- Skin corrosion/irritation : No data
- Serious eye damage/eye irritation : Not irritating (rabbit)
- Respiratory sensitization : No data
- Skin sensitization : No data
- Carcinogenicity : No data
- Germ cell mutagenicity : No data
- Reproductive toxicity : No data
- Specific target organ systemic toxicity(single exposure) : No data
- Specific target organ systemic toxicity(repeated exposure) : No data
- Aspiration hazard : No data

(Propane)

1) Information on the likely routes of exposure

- Inhalation : Nausea, vomiting, irregular heartbeat, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, suffocation, convulsions, unconsciousness, coma
- Ingestion : Ingestion of a gas is unlikely.
- Skin contact : Blisters, frostbite
- Eye contact : Frostbite, blurred vision

2) Delayed and immediate effects and chronic effects from short or long term exposure

- Acute toxicity
 - Oral : 6960 mg/kg – Rat
 - Dermal : No data
 - Inhalation : LC50 Rat 658 mg/L 4 h

<input type="radio"/> Skin corrosion/irritation :	No data
<input type="radio"/> Serious eye damage/eye irritation :	Not irritating (rabbit)
<input type="radio"/> Respiratory sensitization :	No data
<input type="radio"/> Skin sensitization :	No data
<input type="radio"/> Carcinogenicity :	No data
<input type="radio"/> Germ cell mutagenicity :	No data
<input type="radio"/> Reproductive toxicity :	No data
<input type="radio"/> Specific target organ systemic toxicity(single exposure) :	No data
<input type="radio"/> Specific target organ systemic toxicity(repeated exposure) :	No data
<input type="radio"/> Aspiration hazard :	No data

3) Numerical measures of toxicity(such as ATE)

No data

12. Ecological Information

1) Hazardous to the aquatic environment

<input type="radio"/> Fish :	No data
<input type="radio"/> Crustacea :	No data
<input type="radio"/> Algae :	No data

2) Persistence and degradability

<input type="radio"/> Persistence :	No data
<input type="radio"/> Degradability :	No data

3) Bioaccumulative potential

<input type="radio"/> Biodegradability :	No data
<input type="radio"/> Bioaccumulation :	No data

4) Other adverse effects

No data

13. Disposal Considerations

1) Disposal methods

Dispose according to the related regulations.

2) Disposal cautions

Follow details of the related waste management act.

14. Transport Information

1) UN number

1011

2) UN Proper Shipping Name

BUTANE

3) Transport hazard classes

2.1

4) Packing group, if applicable

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5) Environmental hazards

Determined

6) Special precautions for user

☐ Emergency management type of fire : F+D

☐ Emergency management type of leak : S+U

15. Regulatory Information

1) Industrial safety and health act (Korea)

This product may be regulated, have exposure limits

2) Toxic chemical substance subject to management act (Korea)

Not determined

3) Wastes control act (Korea)

Not determined

4) Hazardous material safety act (Korea)

No data

5) Other internal and foreign acts

☐ Persistent organic pollutant control act (Korea) : Not determined

☐ EC classification

— Classification : F +; Carc.Cat.1; Muta. Cat. 2

— Risk Phrases : R12, R45, R46

— Safety Phrases : S45, S53

- U.S. acts
 - OSHA (29CFR1910.119) : Not determined
 - CERCLA 103 (40CFR302.4) : Not determined
 - EPCRA 302 (40CFR355.30) : Not determined
 - EPCRA 304 (40CFR355.40) : Not determined
 - EPCRA 313 (40CFR372.65) : Not determined
- Rotterdam Convention on Harmful Chemicals & Pesticides : Not determined
- Stockholm document : Not determined
- Montreal protocol : Not determined

16. Other Information

1) References

UN RTDG Recommendations on the TRANSPORT OF DANGEROUS GOODS

ILO ICSC <http://www.inchem.org/documents/icsc/icsc/eics0319.htm>

IUCLID Dataset

KOSHA Material Safety Data Sheet

http://www.superiorpropane.com/data/1/rec_docs/467_API_133512_eng_propane.pdf

ACGIH 2008 Guide to occupational exposure values

2) Date of preparation of the first version of the SDS

2011-02-25

3) Revised frequency and Date of preparation of the latest version of the SDS

2012-06-22 (Version 1)

2012-11-19 (Version 2) Change of the vol.%

(C4 70%> Vol.→85%>Vol., C3 10~30%< Vol.→15%< Vol.)

2013-03-06 (Version 3) Change of the Cas No.

(Butane 106-97-8.→ Liquefied petroleum gas 68476-07-25)

4) Others

ACGIH: American Conference of Governmental Industrial Hygienists(www.acgih.org)

AIHA : American Industrial Hygiene Association

ANSI : American National Standards Institute

API: American Petroleum Institute

CERCLA: Comprehensive Emergency Response, Compensation, and Liability Act

DOT: U.S. Department of Transportation

EPA: US Environmental Protection Agency(www.epa.gov)

HMIS: Hazardous Materials Identification System

IARC: International Agency for Research on Cancer

KOSHA Korea Occupational Safety and Health Agency (www.kosha.net)

NFPA: National Fire Protection Association

N/A: Not Applicable

NIOSH: National Institute for Occupational Safety and Health

NTP: National Toxicology Program
LC50: Lethal Concentration, 50 Percent
LD50: Lethal Dose, 50 Percent
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
OPA: Oil Pollution Act of 1990
OSHA :U.S. Occupational Safety & Health Administration
PEL: Permissible Exposure Limit (OSHA)
REL: Recommended Exposure Limit (NIOSH)
RCRA: Resource Conservation and Recovery Act
RTECS: Registry of Toxic Effects of Chemical Substances(<http://www.cdc.gov/niosh/rtecs/>)
STEL Short-Term Exposure Limit (generally 15 minutes)
SARA: Superfund Amendments and Reauthorization Act of 1986 Title III
SPCC: Spill Prevention, Control, and Countermeasures
TLV: Threshold Limit Value (ACGIH)
TSCA: Toxic Substances Control Act
TWA: Time Weighted Average (8 hr.)
WHMIS: Workplace Hazardous Materials Information System (Canada)(<http://www.whmis.net/>)
WEEL: Workplace Environmental Exposure Level (AIHA)
MOL: Ministry of Labor, Korea