

Product name	CAS No.	UN No.	EU No.
Propane	74-98-6	1978	200-827-9

1. Product and company identification

- a) Product name Propane
- b) Recommended use of the chemical and restrictions on use
- Recommended use of the chemical Residential & Commercial, fuel, refrigerant, petrochemical raw material
 - Restrictions on use No Data Available
- c) Manufacturer / Supplier Information
- Name SK GAS
 - Address ECO Hub, SK Chemicals Complex, 332, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
 - Emergency phone number 82-2-6200-8162

2. Hazards identification

- a) Hazard-Risk Classification
- Flammable gases : 1
Gases under pressure : liquefied gas or Refrigerated liquefied gas
Skin corrosion / irritation : 2

b) Label elements including precautionary

- Symbol



- Signal word Danger
- Hazard-risk statement
- H220 Extremely flammable gas
H280 Contains gas under pressure; may explode if heated
H281 Contains refrigerated gas; may cause cryogenic burns or injury.
H315 Causes skin irritation
- Precautionary statement
- Prevention
- P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P264 Wash handling area thoroughly after handling
P280 Wear protective gloves/protective clothing/eye protection/face protection
P282 Wear cold insulating gloves/face shield/eye protection.
- Response
- P302+P352 If on Skin: Wash with plenty of soap and water
P315 Get immediate medical advice/attention.
P321 Take a Specific treatment
P332+P313 If skin irritation occurs: Get medical advice/attention
P336 Thaw frosted parts with lukewarm water. Do not rub affected areas.
P362+P364 Take off contaminated clothing and wash it before reuse.
- Storage
- P403 Store in a well-ventilated place
P410+P403 Protect from sunlight. Store in a well-ventilated place
- Disposal
- Not available

c) Other Hazard Risk (NFPA)

- Propane		
Health		1
Flammability		4
Reactivity		0
- n-Butane		
Health		1
Flammability		4
Reactivity		0
- iso-butane		
Health		1
Flammability		4
Reactivity		0
- Ethane		
Health		1
Flammability		4
Reactivity		0
- Propylene		
Health		1
Flammability		4
Reactivity		1

3. composition / information in ingredients

Chemical name	Other name	CAS 번호	Content (mol%)
Propane	Propane	74-98-6	95 ~ 100%
Butane	Butane mixture	68513-65-5	0 ~ 5%
Ethane	Ethane	74-84-0	0 ~ 5%
Propylene	Propene	115-07-1	< 1%
1,3-Butadiene	1,3-Butadiene	106-99-0	< 0.1%
Total			100 %

* The product is not a mixture of several single substances and the components listed are constituents of a single substance.

4. First aid measure

a) Eye contact	Seek medical attention immediately.
b) Skin contact	If frostbite has occurred, seek medical attention immediately; Do NOT rub the affected areas In order to prevent further tissue damage, do NOT attempt to remove frozen clothing and cool the frostbite part as long as possible with cold water. Before to remove frozen clothing, thaw it If frostbite has NOT occurred, immediately wash contaminated skin with soap and water If skin trouble occurred, get medical attention and advice.
c) Inhalation	Seek medical attention immediately. Keep the affected person warm and at rest. If a person breathes large amounts of this chemical, move the exposed person to If breathing is difficult, give oxygen. If breathing has stopped, perform mouth-to-mouth resuscitation.

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| d) Ingestion | Seek medical attention immediately. |
| e) Notes for physician | Keep a doctor to recognize chemical substance and take care of patients. |

5. Fire-fighting measures

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| a) Suitable (and unsuitable) extinguishing | <p>CO₂, dry chemical, water spray or fog for surrounding area.</p> <p>Use dry sand or earth for the smothering extinguishment</p> |
| b) Specific hazards arising from the chemical | <p>Extreme flammable gas</p> <p>A leakage of material may present a fire / explosion risk.</p> <p>There is a risk of steam explosion in indoor, outdoor and sewer.</p> <p>It will ignite easily by heat, spark and flame.</p> <p>Vapors may ignite and explode.</p> <p>Shut off source of propane, if possible, dilute leakage of water.</p> <p>Keep away from contact with clothing and other combustible materials to avoid</p> <p>Avoid friction or rough handling because of fire hazard.</p> <p>Allow gas to burn if flow cannot be shut off.</p> <p>Eliminate sources of ignition.</p> <p>Evacuate area and fight fire from a safe distance</p> <p>Leaking gas fire : do not stop extinguish unless leak can be stopped safely.</p> |
| c) Special protective equipment and precautions for fire-fighters | <p>Keep away from contact with clothing and other combustible materials to avoid</p> <p>Avoid friction or rough handling because of fire hazard.</p> <p>Allow gas to burn if flow cannot be shut off.</p> <p>Eliminate sources of ignition.</p> <p>Evacuate area and fight fire from a safe distance</p> <p>Leaking gas fire : do not stop extinguish unless leak can be stopped safely.</p> <p>Move container from fire area if it is not dangerous.</p> <p>Be careful that broken cylinders may fly over.</p> <p>Isolate the hazard area and deny entry to unnecessary and unprotected personnel.</p> <p>Do not touch the exposure source or safety device directly, as it may freeze in the</p> <p>In case of a tank fire, use fire extinguisher at enough distance or use unmanned</p> <p>After fire has extinguished, flush with plenty of water for a long time to cool</p> <p>In case of a tank fire, immediately leave the fire area if there is treble sound or discoloration of the tank.</p> <p>In case of a tank fire, get out of the area If the tank is in flames</p> <p>Evacuate in accordance of accident situation. (Evacuation radius : 0.8 km, The spread range varies depending on the location of the accident and the fire</p> |

6. Accidental release measures

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|--|---|
| a) Personal precautions, protective equipment and emergency procedures | <p>Use non-sparking equipment when cleaning up flammable spill.</p> <p>In closed spaces, wear a self-contained breathing apparatus and ventilate.</p> <p>Isolate the hazard area and deny entry to unnecessary and unprotected personnel.</p> <p>Avoid inhalation and skin contact, contaminated clothing should be changed.</p> <p>Contain spilled liquid with sand or earth. do NOT use combustible materials.</p> <p>Dust can be a fire or explosion hazard.</p> <p>Immediately wipe the spill, follow precautions for protective equipment.</p> |
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|---|--|
| a) Personal precautions, protective equipment and emergency procedures
(Continued) | <p>If possible, turn the leak valve of container to be released as gas rather than ventilate the contaminated area.</p> <p>Do not touch the leak source directly.</p> <p>Using water spray to reduce the vapor or vapor clouds of gas and do not allow</p> <p>Always ground all equipment when handling material</p> |
| b) Environmental precautions and protective procedures | <p>Keep out of drains, sewers, ditches and waterways.</p> <p>Use appropriate container to avoid environmental contamination.</p> <p>Cover with absorbent or contain, Collect and dispose.</p> |
| c) Methods and materials for containment | <p>If possible, release in vapor by turning over leaking container.</p> <p>Clean the contaminated zone using cleanser and water.</p> <p>Use water spray/fog for prevent spread.</p> |

7. Handling and storage

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|---|---|
| a) Precautions for safe handling | <p>To avoid sudden release of pressure, loosen closure cautiously before opening.</p> <p>Avoid inhalation, skin and eyes.</p> <p>Use only clean, dry utensils in handling.</p> <p>Minimize dust generation and accumulation.</p> <p>Do not smoke or use matches or lighters during use and until vapors are gone.</p> <p>To dissipate static electricity during transfer, ground drum and connect to receiving container with bonding strap.</p> <p>Avoid prolonged or repeated skin contact.</p> <p>Wash thoroughly after handling.</p> <p>Avoid breathing gas or vapor.</p> |
| b) Conditions for safe storage
(including any incompatibilities) | <p>Keep away from heat, spark and flame – No Smoking.</p> <p>Avoid direct sunlight and store in a well-ventilated place.</p> <p>The empty cylinder should be completely drained, properly blocked and immediately returned to the cylinder regulator. Place it properly.</p> <p>Stored containers should be periodically checked for general conditions and leakage.</p> <p>Keep container tightly closed.</p> <p>Store in a cool, well-ventilated area.</p> |

8. Exposure controls and personal protection

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|---|---------------------------------------|
| a) Control parameter and Biological Exposure Indices | |
| Domestic regulation | |
| Propane | TWA - 1,000ppm 1,800mg/m ³ |
| Butane | TWA - 800ppm 1,900mg/m ³ |
| Isobutane | TWA - 800ppm 1,900mg/m ³ |
| Ethane | No Data Available |
| Propylene | No Data Available |
| ACGIH TLV-TWA (Threshold Limit Value - Time Weighted Average) | |
| Propane | TWA 1,000 ppm 8hours (3/2012) |
| Butane | TWA 1,000 ppm 8hours (3/2012) |
| Isobutane | TWA 1,000 ppm 8hours (3/2012) |
| Ethane | TWA 1,000 ppm 8hours (3/2012) |
| Propylene | TWA 500 ppm 8hours (3/2012) |

Biological Exposure Indices (BEI)

Propane	No Data Available
Butane	No Data Available
Isobutane	No Data Available
Ethane	No Data Available
Propylene	No Data Available

- b) Appropriate engineering controls Adequate ventilation should be provided so that exposure limits are not exceeded. In case of risk explosion, use explosion-proof ventilation equipment.
- c) Personal protective equipment
- Respiratory protection Use NIOSH approved positive-pressure, supplied air respirator with escape bottle.
 - Eye protection Where there is a possibility of liquid contact, wear splash-proof safety goggles and faceshield.
 - Hands protection Use cold-impervious, insulating gloves where contact with liquid may occur.
 - Body protection Where contact with liquid may occur, wear apron and faceshield.

9. Physical and chemical properties

- a) Appearance
- Color Colorless
 - Physical state Gas, liquid at low temperature, high pressure
- b) Odor Odorless (before injecting an odorizer), Characteristic odor (after injecting an odorizer)
- c) Odor threshold The odor of gas shall be detected when the gas/air compound ratio reaches 1/1000. (after injecting an odorizer)
- d) pH Not applicable
- e) Melting /freezing point about -187.68 ~ -180°C
- Propane -187.68°C
 - Butane -138.29°C
 - Isobutane -159.61°C
 - Ethane -183.3°C
 - Propylene -185.26°C
- f) Initial boiling point and boiling range about -44 ~ -40°C
- Propane -42.11°C
 - Butane -0.49°C
 - Isobutane -11.75°C
 - Ethane -88.58°C
 - Propylene -47.62°C
- g) Flash point about -106 ~ -100°C
- Propane -104°C
 - Butane -60°C
 - Isobutane -83°C
 - Ethane -135°C
 - Propylene -108°C
- h) Evaporation rate No Data Available
- i) Flammability (liquid, gas) Flammable gas

j) Upper / lower flammability	about 9.5% / about 2.1%
- Propane	9.5% / 2.1%
- Butane	8.4% / 1.8%
- Isobutane	8.4% / 1.8%
- Ethane	12.5% / 3.0%
- Propylene	10.4% / 2.4%
k) Vapor pressure	about 8 Bar (at 21°C)
- Propane	8.587 Bar (at 21°C)
- Butane	2.148 Bar (at 21°C)
- Isobutane	3.126 Bar (at 21°C)
- Ethane	38.475 Bar (at 21°C)
- Propylene	10.512 Bar (at 21°C)
l) Solubility	about 62mg/L (at 25°C)
- Propane	62.5mg/L (at 25°C)
- Butane	61mg/100mL (at 20°C)
- Isobutane	48.9mg/L (at 25°C)
- Ethane	60.2mg/L (at 25°C)
- Propylene	200mg/L (at 25°C)
m) Vapor density	about 1.55 (air=1)
- Propane	1.55
- Butane	2.07
- Isobutane	2.01
- Ethane	1.05
- Propylene	1.5
n) Specific gravity	about 0.508 (at 15°C)
- Propane	0.58088 kg/L (at boiling point, 1.013bar)
- Butane	0.60126 kg/L (at boiling point, 1.013bar)
- Isobutane	0.59382 kg/L (at boiling point, 1.013bar)
- Ethane	0.54383 kg/L (at boiling point, 1.013bar)
- Propylene	0.61006 kg/L (at boiling point, 1.013bar)
o) Partition coefficient (n-octanol / water)	about 2.36
- Propane	2.36
- Butane	2.89
- Isobutane	2.76
- Ethane	1.81
- Propylene	1.77
p) Autoignition temperature	About 430°C (The Lowest temperature of all substance)
- Propane	470°C
- Butane	430°C
- Isobutane	460°C
- Ethane	515°C
- Propylene	460°C
q) Decomposition temperature	No Data Available
r) Viscosity	No Data Available

s) Molecular weight	About 44.2
- Propane	44.0965
- Butane	58.1234
- Isobutane	58.1234
- Ethane	30.0696
- Propylene	42.0806

10. Stability and reactivity

a) Chemical stability and possibility of hazardous reactions	<p>Extreme Flammable gas.</p> <p>A leakage of material may present a fire / explosion risk.</p> <p>There is a risk of steam explosion in indoor, outdoor and sewer.</p> <p>It will ignite easily by heat, spark and flame.</p> <p>Vapors may ignite and explode.</p> <p>Vapor can move to the ignition source and flash back.</p> <p>Vapors may cause dizziness or asphyxiant without awareness</p> <p>Cylinders exposed to fire may release flammable gas.</p>
b) Conditions to avoid	Keep away from strong oxidizers, ignition sources and heat – no smoking.
c) Incompatible materials	No Data Available
d) Hazardous decomposition products	Carbon monoxide, carbon dioxide and non-combusted hydrocarbons(smoke).

11. Toxicological information

a) Information on the likely routes on	
- Propane	nausea, vomiting, irregular heart rate, headaches, drowsiness, dizziness, disorientation, emotional lability, inebriation, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy, shortness of breath, central nervous system (CNS) depression.
- Butane	It can cause stimulus, nausea, vomiting, shortness of breath, irregular heart rate, headaches, drowsiness, fatigue, dizziness, disorientation, emotional lability, inebriation, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy.
- Isobutane	It can cause stimulus, nausea, vomiting, shortness of breath, irregular heart rate, headaches, drowsiness, fatigue, dizziness, disorientation, emotional lability, inebriation, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy.
- Ethane	nausea, vomiting, irregular heart rate, headaches, drowsiness, dizziness, disorientation, emotional lability, inebriation, adjustment (feature) loss, asphyxiant, convulsion, loss of consciousness, lethargy, shortness of breath, central nervous system (CNS) depression.
- Propylene	No Data Available
b) Health hazards information	
- Acute toxic	
Oral	No Data Available
Dermal	No Data Available

Inhalation	
Propane	LC50 800,000 ppm 15 min Rat
n-Butane	LC50 800,000 ppm 15 min Rat
iso-butane	LC50 658,000mg/m ³ 4 hr Rat
Ethane	LC50 658,000mg/m ³ 4 hr Rat
Propylene	LC50 658,000mg/m ³ 4 hr Rat
- Skin corrosive / irritant	
Propane	No Data Available (EU Directive 67/548) rabbit /irritating (IUCLID)
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	It is Not causing skin irritantation
- Serious eye damage / eye irritation	
Propane	No Data Available (EU Directive 67/548/EEC) Rabbit/ not irritating (IUCLID)
n-Butane	Non-stimulated (rabbit)
iso-butane	Non-stimulated (rabbit)
Ethane	Non-stimulated (rabbit)
Propylene	Causing weaker stimulation for the human eye.
- Respiratory sensitization	
No Data Available	
- Skin sensitization	
No Data Available	
- Carcinogenicity	
Not applicable	
The occupational safety and Labor Ministry Notice	
No Data Available	
Not Listed	
Propane	No Data Available
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	No Data Available
IARC	Not Listed
OSHA	Not Listed
ACGIH	No Data Available
NTP	Not Listed
- EU CLP	
No Data Available	
Propane	No Data Available
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	No Data Available
- Germ cell mutagenicity	
Not applicable	
Propane	No Data Available
n-Butane	Back mutation test using microorganism – negative
iso-butane	Back mutation test using microorganism – negative
Ethane	Back mutation test using microorganism – negative
Propylene	Back mutation test using microorganism – negative
- Reproductive toxicity	
No Data Available	

- Specific target organ toxicity (single)	Not applicable(EU Directive 67/548/EEC)
Propane	No Data Available
n-Butane	In high concentration, causing narcosis and depressing-central nervous system.
iso-butane	No Data Available
Ethane	In high concentration, causing narcosis and depressing-central nervous system.
Propylene	Affects the central nerves.
- Specific target organ toxicity (repeated)	
Propane	No Data Available
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	Have no side effects taking propylene 10,000ppm with repeated exposure for
- Aspiration hazard	No Data Available

12. Ecological information

a) Aquatic and terrestrial ecotoxicity

- fish	
Propane	LC50 > 100 mg/l 96 hr ((Species : Fish TLm))
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	No Data Available
- Crustacean	
Propane	LC50 52.157 mg/l 48 hr
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	No Data Available
- Algae	
Propane	LC50 32.252 mg/l 96 hr
n-Butane	No Data Available
iso-butane	No Data Available
Ethane	No Data Available
Propylene	No Data Available

b) Persistence and degradability

- Persistence	
Propane	log Kow 2.36
n-Butane	log Kow 2.89
iso-butane	log Kow 2.76
Ethane	log Kow 1.81
Propylene	log Kow 1.77
- Degradability	No Data Available

c) Bioaccumulative potential

- Accumulative

Propane	BCF 13
n-Butane	No Data Available
iso-butane	BCF 1.57~1.97
Ethane	No Data Available
Propylene	BCF 13.18

- Biodegradability

Propane	65.7% 35day
n-Butane	65.7% 35day (aerobic, microbes, well-decomposed)
iso-butane	65.7% 36day (aerobic, microbes, well-decomposed)
Ethane	65.7% 37day (aerobic, microbes, well-decomposed)
Propylene	65.7% 35day

d) Mobility in soil No Data Available

e) Other adverse effects No Data Available

13. Disposal considerations

- a) Disposal method All disposal practices must be in compliance with all laws and regulations with elimination of the risk of explosion.
- b) Disposal precaution Beware of fire and explosion hazards due to residual gas in the container like cylinder or tank
Disposal should be in accordance with applicable regional, national and local laws and regulations.

14. Transport information

- a) UN number 1978
- | | |
|------------|------|
| Propane | 1978 |
| n-Butane | 1011 |
| iso-butane | 1969 |
| Ethane | 1035 |
| Propylene | 1077 |
- b) UN proper shipping name PROPANE
- c) Transport hazard class(es) 2.1
- d) Packing group, if applicable No Data Available
- e) Environmental hazards No Data Available
- f) Special precaution for user
- | | |
|-------------------------------------|-----|
| - emergency procedures in a fire | F-D |
| - emergency procedures with the gas | S-U |

15. Regulatory information

- a) Regulations by the occupational safety and
- | | |
|------------|--------------------------------|
| Propane | Not applicable |
| n-Butane | Substance with exposure limits |
| iso-butane | Not applicable |
| Ethane | Not applicable |
| Propylene | Not applicable |

b) Act on registration, evaluation, etc of chemicals (domestic)

Propane	Not Listed
n-Butane	Not Listed
iso-butane	Not Listed
Ethane	Not Listed
Propylene	Not Listed

c) Chemicals control act (domestic)

Propane	Not Listed
n-Butane	Not Listed
iso-butane	Not Listed
Ethane	Not Listed
Propylene	Not Listed

d) Regulation by the act on the safety control of hazardous substances (domestic)

Not applicable

e) Regulation by wastes control act (domestic)

Propane	Designated waste
n-Butane	Designated waste
iso-butane	Designated waste
Ethane	Not applicable
Propylene	Not applicable

f) The other regulation by domestic and foreign act

- Domestic regulation

Persistent organic pollutants control act	Not applicable
High-pressure gas safety control act	Flamable, Liquefied gas
Safety control and business of liquefied petroleum gas act	Liquefied petroleum gas

- Foreign regulation

OSHA regulation	Not regulated
CERCLA103 (40CFR302.4)	Not regulated
SARA302 (40CFR355.30)	Not regulated
SARA304 (40CFR355.40)	Not regulated
SARA311/312 (40CFR370.21)	Not regulated
SARA313 (40CFR372.65)	Not regulated
EPCRA (section 302)	Not regulated
EPCRA (section 304)	Not regulated
EPCRA (section 313)	Not regulated
Rotterdam Convention	Not regulated
Stockholm Convention	Not regulated
Montreal protocol	Not regulated
EU REACH (classification result)	F+; R12
Propylene	F+; R12
EU REACH (risk statement)	R12
Propane	R12
n-Butane	R12
iso-butane	R12
Ethane	R12

EU REACH(safety statement)	S2, S9, S16
Propane	S2, S9, S16
n-Butane	S2, S9, S16
iso-butane	S2, S9, S16
Ethane	S2, S9, S16, S33
Propylene	S2, S9, S16, S33

16. Other information

a) Information source and references

ECB-ESIS(European chemical Substances Information System)(<http://ecb.jrc.it/esis>)
 ECOTOX Database, EPA(<http://cfpub.epa.gov/ecotox>)
 IUCLID Chemical Data Sheet, EC-ECB
 International Chemical Safety Cards(ICSC)(<http://www.nihs.go.jp/ICSC>)
 TOXNET, U.S. National Library of Medicine(<http://toxnet.nlm.nih.gov>)
 The Chemical Database, The Department of Chemistry at the University of Akron(<http://ull.chemistry.uakron.edu/erd>)
 Transport of Dangerous Goods - UN
 Chemical Information System, National Environmental Science Institute(<http://ncis.nier.go.kr>)
 Korea Occupational Safety and Health Agency MSDS Database
 Corporate Solution From Thomson Micromedex(<http://csi.micromedex.com>)
 Industrial poisoning handbook, Shin Kwang Publishing Co.
 Dangerous Material Information Management System, National Emergency Management Agency
 (<http://hazmat.nema.go.kr>)
 UN RTDG
 ICSC
 PATTY(4th, 1994)
 ACGIH (7th, 2001)
 Airliquide (<http://encyclopedia.airliquide.com>)
 Airgas (<http://www.airgas.com>)
 Wikipedia (<http://en.wikipedia.org>)
 GHS (Rev.7) (2017) 7th Ed

b) First Date Created 2010-06-16

c) Number of revisions and date of last revision

Number of revisions	Rev 4
Date of last revision	2020-02-21

d) The other information

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