Product name	CAS No.	UN No.	EU No.
Isobutane	75-28-5	1969	200-857-2

1. Product and company identification

a) Product name — Isoutane

b) Recommended use of the chemical and restrictions on use

- Recommended use of the chemical — Solvent, refrigerant, petrochemical raw material, fuel, consumer use
- 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 — 82-2-6200-8245(A person in charge: Manager Myoung Han No)

2. Hazards identification

a) Hazard-Risk Classification

Physical Hazards — Flammable gases category 1A
Gas under pressure (Liquefied gas)
Gas under pressure (Refrigerated liquefied gas)

Health Hazards — Specific target organ toxicity (single exposure) category 3 (anesthesia)

Encironmental Hazards — Not applicable

b) Label elements including precautionary statements

- 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.
  - (H336) May cause drowsiness or dizziness.
- Precautionary statement
  - Prevention
    - (P210) Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
    - (P282) Wear cold insulating gloves and either face shield or eye protection.
    - (P261) Avoid breathing fume/gas.
    - (P271) Use only outdoors or in a well-ventilated area.
  - Response
    - (P377) Leaking gas fire: Do Not extinguish, unless leak can be stopped safely.
    - (P381) In case of leakage, eliminate all ignition sources.
    - (P336) Melt the frozen part with lukewarm water. Do not rub damaged areas.
    - (P315) Seek medical advice immediately.
    - (P304+P340) IF INHALED: Remove person to fresh air and keep comfortable fro breathing.
    - (P312) Get medical help if you feel unwell.
  - Storage
    - (P403) Store in a well-ventilated place.
    - (P410+P403) Protect from sunlight. Store in a well-ventilated place.
    - (P403+P233) Store in a well-ventilated place. Keep container tightly closed.
    - (P405) Store locked up.
  - Disposal
    - (P501) Dispose of contents/container to in accordance with local/regional/national/international regulations.

c) Other Hazard. Risk which are not included in the classification criteria

- Isobutane

Health	0
Flammability	4
Reactivity	0

3. composition / information in ingredients

Chemical name	Other name	CAS 번호	Content (mol%)
Propane	Propane	74-98-6	0 ~ 5%
Butane	Butane	68513-65-5	0 ~ 5%
Isobutane	2-methylpropane	75-28-5	95 ~ 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	Seek medical attention immediately In case of contact with liquefied gas, melt the affected area with lukewarm water. Before removing frozen clothes from the skin, defrost. In the case of burns, immediately cool the area with cold water for as long as possible, and do not remove clothing that sticks to the skin. If on skin, wash with plenty of soap and water. If skin irritation occurs, get medical advice/attention.
c) Inhalation	Seek medical attention immediately. Keep the affected person warm and at rest.
d) Ingestion	Move to a place with fresh air.
e) Notes for physician	If breathing is difficult, give oxygen. If breathing has stopped, perform mouth-to-mouth resuscitation.
d) Ingestion	Seek medical attention immediately.
e) Notes for physician	Ensure that medical personnel are aware of the substance and take protective measures.

5. Fire-fighting measures

a) Suitable (and unsuitable) extinguishing media	CO2, dry chemical, water spray or fog for surrounding area. Use dry sand or earth for the smothering extinguishment
b) Specific hazards arising from the chemical	
Risks for fire or explosion	Extreme flammable gas
Hazardous substances generated during combustion	Vapor may cause diziness or asphyxiant without awareness
NFPA flammability rating	4
c) Special protective equipment and precautions for fire-fighters	Be careful as some leave a flammable residue after evaporation. In case of a leaky gas fire, do not try to extinguish the fire unless the leak can be stopped safely. Remove all sources of ignition if possible to handle safely. Rescuers should wear appropriate protective gear.

	Get out of the area and keep a safe distance to extinguish. Be careful as liquefied gas vapor is heavier than air and spreads along the ground. Move containers from fire area if it is not hazardous. Be careful as a damaged cylinder may fly off. Block access by unauthorized persons, isolate hazardous area and deny entry. Do not pour water directly to an exposure source or safety device as it may freeze in case of tank fire. In case of tank fire, extinguish at maximum distance or use unmanned fire extinguishing equipment. In the event of a tank fire, immediately back off if there is a high-pitched sound or discoloration of the tank.

6. Accidental release measures

a) Personal precautions, protective equipment and emergency procedures	Stop leak if not hazardous. Eliminate all ignition sources. Be aware of substances and conditions to avoid. Isolate contaminated area until gas is fully diffused and diluted. Do not touch the exposed material or walk around as it can break easily. Do not enter unless required or without protective equipment. Wipe up spills immediately and follow precautions in protective equipment section. If possible, turn the leakage container to release gas rather than liquid. Ventilate the contaminated area. Do not flush directly into the leak source. Do not allow water to come into contact with spillage by reducing vapors using water spray or by dispersing vapor clouds.
b) Environmental precautions and protective procedures	
Atmosphere	Avoid release to the environment.
Soil	Avoid release to the environment.
Water	Prevent entry into waterways, sewers, basements, and confined spaces.
c) Methods and materials for containment and cleaning up	
Small spills	Absorb spills from inert substances (such as dry sand or soil), and place in a chemical waste container. Build dikes for fire extinguishing and collect water.
Large spills	Absorb liquid and wash contaminated area with detergent and water.

7. Handling and storage

a) Precautions for safe handling	Do not handle until all safety precautions have been read and understood. Handle only outdoors or in a well-ventilated area. Work with reference to engineering controls and personal protective equipment. Be sure to ground all equipment when handling material. Be aware of substances and conditions to avoid. Do not apply pressure, cut, weld, solder, bond, puncture, abrade, or expose to heat, flame, sparks, static electricity, or other sources of ignition. Follow all MSDS/label precautions as product residue may remain after container is emptied. Avoid prolonged or prolonged skin contact. Wash the affected area thoroughly after handling. Avoid breathing gas/vapours.
b) Conditions for safe storage (including any incompatibilities)	Keep away from heat, spark and flame – No Smoking. Avoid direct sunlight and store in a well-ventilated place. The empty cylinder should be completely drained, properly blocked and immediately returned to the cylinder regulator. Place it properly. Do not expose the container to heat as pressure may rise when exposed to heat. Store in a cool, well-ventilated area. Be aware of substances and conditions to avoid.

8. Exposure controls and personal protection

a) Control parameter and Biological Exposure Indices

KOSHA	
Propane	TWA: 1,000ppm
Butane	TWA: 800ppm
Isobutane	TWA: 801ppm
ACGIH	
Propane	TLV-TWA: 1,000ppm
Butane	TLV-TWA: 1,000ppm
Isobutane	TLV-TWA: 1,001ppm
OSHA	
Propane	PEL-TWA: 1,000ppm PEL-STEL: 1,800ppm
Butane	Not applicable
Isobutane	Not applicable
NIOSH	
Propane	REL-TWA(10hr): 1,000ppm REL-STEL: 1,000ppm
Butane	Not applicable
Isobutane	Not applicable
Biological exposure standard	Not available

b) Appropriate engineering controls: Facilities storing or using this material should be equipped with eyewash facilities and safety showers.
Manage ventilation facilities to be below the allowable concentration, and install explosion-proof ventilation if there is a risk of explosive concentration.

c) Personal protective equipment

- Respiratory protection	If there is a possibility of direct contact or exposure to the substance, wear appropriate Korea Occupational Safety and Health Agency authorized respirator.
- Eye protection	If there is a possibility of direct contact or exposure to the substance, wear appropriate Korea Occupational Safety and Health Agency authorized goggles.
- Hands protection	If there is a possibility of direct contact or exposure to the substance, wear appropriate Korea Occupational Safety and Health Agency authorized gloves for
- Body protection	If there is a possibility of direct contact or exposure to the substance, wear appropriate Korea Occupational Safety and Health Agency authorized protective

9. Physical and chemical properties

a) Appearance

- Color	Colorless
- Physical state	Liquefied gas
b) Odor	Odorless (before injecting an odorizer), Characterisitic ordor (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 -165~-150℃
f) Initial boiling point and boiling range	about -15 ~5℃
g) Flash point	about -90 ~ -70℃
h) Evaporation rate	Not available
i) Flammability (liquid, gas)	Flammable gas
j) Upper / lower flammability	about 8.4% / about 1.8%
k) Vapor pressure	about 3.0 Bar (at 21℃)
l) Solubility	about 50mg/L (at 25℃)
m) Vapor density	about 2 (air=1)

n) Specific gravity	about 0.57 (at 15℃)
o) Partition coefficient (n-octanol / water)	about 2.8 (log Kow)
p) Autoignition temperature	About 420℃ (The Lowest temperature of all substance)
q) Decomposition temperature	Not available
r) Viscosity	Not available
s) Molecular weight	About 58.4

10. Stability and reactivity

a) Chemical stability and possibility of hazardous reactions	Extreme Flammable gas. Contains high pressure gas; may explode when heated. Forming an explosive mixture with air. Container may explode when heated. Easily ignited by heat, sparks, and flames. Vapor can flash back by moving to the ignition source. Steam can cause dizziness or suffocation without awareness. Some substances can be irritating when inhaled at high concentrations.
b) Conditions to avoid	Cylinder exposed to fire can release flammable gas.
c) Incompatible materials	Heat decomposition or combustion may produce irritating and highly toxic gases during burning.
d) Hazardous decomposition products	Be careful as some leave a flammable residue after evaporation.

11. Toxicological information

a) Information on the likely routes on exposure	
- Inhalation through the respiratory tract	May cause anesthesia
- Ingestion through the mouth	Not available
- Skin contact	Not available
- Eye contact	Not available
b) Health hazards information	
- Acute toxicity	
Oral	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
Dermal	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
Inhalation	Since the estimated acute toxicity of isobutane exceeds 20 mg/L, the product corresponds as 'Not classified'
Propane	ATE: 1,237mg/L 2hr Mouse, LC50 658mg/L 4hr Rat
Butane	Not available
Isobutane	LC50 658 ㎎/ℓ 4 hr Rat

- Skin corrosion / irritation	Since the total contents of Category 2 substances is less than 10%, the product corresponds as 'Not classified'.
Propane	Category 2 rabbit/irritating(IULID)
Butane	Not available
Isobutane	Not available
- Eye damage / irritation	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Respiratory sensitization	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Skin sensitization	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Carcinogenicity	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Germ cell mutagenicity	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Reproductive toxicity	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Specific target organ toxicity (single exposure)	Since the contents of Category 3 substances is more than 20%, the product is classified as "Specific target organ toxicity (single exposure) Category 3 (anesthesia)"
Propane	Category 3 (anesthesia)
Butane	Category 3 (anesthesia)
Isobutane	Category 3 (anesthesia)
- Specific target organ toxicity (repeated exposure)	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available
- Aspiration hazard	Not available
Propane	Not available
Butane	Not available
Isobutane	Not available

12. Ecological information

a) Aquatic hazard	
- Acute	The product is classified as 'Not classified'.
Propane	LC50 (4days): 24.11-147.54mg/L (Fish)
Butane	LC50 (48hr): 17.133mg/L (Daphnia magna)
Isobutane	Not available
- Chronic	The product is classified as 'Not classified'.
Propane	Not available
Butane	Not available
Isobutane	Not available
b) Persistence and degradability	
- Persistence	log Kow: 2.36 (Propane), 2.89 (Butane), 2.76 (Isobutane)
- Degradability	Not available
c) Bioaccumulative potential	
- Biodegration	65.7% 35day (Propane, Butane, Isobutane)
- Bioaccumulative potential	BCF: 13 (Propane), 1.57~1.97 (Isobutane)
d) Mobility in soil	Not available
e) Other adverse effects	
- Hazard to the Ozone layer	
Propane	Not available
Butanes	Not available
Isobutane	Not available
- Others	Not 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	1969
b) UN proper shipping name	ISOBUTANE
c) Transport harzad class(es)	2.1
d) Packing group, if applicable	Not applicable
e) Environmental harzards	Not applicable

f) Special precaution which a user to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises

- emergency procedures in a fire	F-D
- emergency procedures with the gas leak	S-U

15. Regulatory information

a) Industrial Safety and Health Act

Propane	Substances subject to PSM submission
Butanes	Substances subject to PSM submission
Isobutane	Substances subject to PSM submission

b) Chemical Control Act

Propane	Not applicable
Butanes	Hallucinogenic substance
Isobutane	Not applicable

c) Dangerous Material Safety Control Act

Propane	Not applicable
Butanes	Not applicable
Isobutane	Not applicable

d) Wastes Management Act (domestic)

Propane	Not applicable
Butanes	Not applicable
Isobutane	Not applicable

e) Other requirements in domestic and other countries

- Water quality and aquatic ecosystem conservation act :	Not applicable
- Clean air conservation act :	Not applicable
- POPs Management Law :	Not applicable

- Information of EU Classification

Classification

Propane	F+; R12
Butanes	Flam. Gas 1 Press. Gas Carc. 1A Muta. 1B
Isobutane	F+; R12 Carc. Cat. 1; R45 Muta. Cat. 2; R46

Risk Phrases

Propane	R12
Butanes	Not applicable
Isobutane	R45, R46, R12

Safety Phrase

Propane	S2, S9, S16
Butanes	Not applicable
Isobutane	S53, S45

- U.S. Federal regulations

OSHA PROCESS SAFETY (29CFR1910.119) :	Not applicable
CERCLA Section 103 (40CFR302.4) :	Not applicable
EPCRA Section 302 (40CFR355.30) :	Not applicable
EPCRA Section 304 (40CFR355.40) :	Not applicable
EPCRA Section 313 (40CFR372.65) :	Not applicable
- Rotterdam Convention listed ingredients :	Not applicable
- Stockholm Convention listed ingredients :	Not applicable
- Montreal Protocol listed ingredients :	Not applicable

16. Other information

a) Information source and references

1. National Chemicals Information System, National Institute of Environmental Research (NCIS)
2. Hazardous Substances Data Bank (HSDB)
3. National Library of Medicine(NLM)
4. Chemical Carcinogenesis Research Information System (CCRIS)
5. Chemicals the Screening Information Dataset (SIDS)
6. International Chemical Safety Cards(ICSC)
7. Canadian Centre for Occupational Health and Safety(CCOHS)
10. U.S. Enviromental Protection Agency(EPA): ECOTOX(ECOTOXicology) database
11. National Emergency Management Agency
12. MSDS, Korea Occupational Safety and Health Agency
13. UNECE - Globally Harmonized System of Classification and Labelling of Chemicals(GHS)
14. Integrated Risk Information System(IRIS)
15. Concise International Chemical Assessment Documents (CICADs)
16. Environmental Health Criteria Monographs (EHCs)
17. Health and Safety Guides (HSGs)
18. Exposure criteria for chemicals and physical factors (Notice No. 2020-48 of the Ministry of Employment and Labor)
19. Act on The Control, ETC. of Manufacture of Specific Substances for the Protection of the Ozone Layer
20. Commission Regulation (EU) No 2015/1221

b) First Date Created	2010-06-16
c) Revision number and date	
Number of revisions	9 / 2023.05.25
d) Others	No express warranty, or implied warranty of merchantability or fitness for a particular purpose is made with respect to the product or the information contained herein.