

**SAFETY DATA SHEET**  
According to OSHA Hazcom Standard 29 CFR 1910.1200  
**Methane 5 cmol/mol and 10 others mix / Helium**

Date of issue: 2022-08-30

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Version: 3.0

**1. IDENTIFICATION**

**A. Product name**

- Methane 5 cmol/mol and 10 others mix / Helium

**B. Recommended use and restriction on use**

- General use : Not available  
- Restriction on use : Not available

**C. Manufacturer / Supplier / Distributor information**

○ **Manufacturer information**

- Company name : RIGAS Co.,Ltd  
- Address : 46,Munpyeongseo-ro 17 beon-gil, Daedeok-gu,Daejeon, KOREA  
- Emergency telephone number : 82-42-934-6900

○ **Supplier/Distributor information**

- Company name : RIGAS Co.,Ltd  
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**2. HAZARD IDENTIFICATION**

**A. GHS Classification**

- Gases under pressure : Compressed gas  
- Germ cell mutagenicity : Category1B  
- Carcinogenicity : Category1A

**B. GHS label elements**

○ **Hazard symbols**



○ **Signal words**

- Danger

○ **Hazard statements**

- H280 Compressed gas ; Contains gas under pressure; may explode if heated  
- H340 May cause genetic defects  
- H350 May cause cancer

○ **Precautionary statements**

**1) Prevention**

- P201 Obtain special instructions before use.  
- P202 Do not handle until all safety precautions have been read and understood.  
- P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.

**2) Response**

- P308+P313 If exposed or concerned: Get medical advice/attention.

**3) Storage**

- P405 Store locked up.  
- P410+P403 Protect from sunlight. Store in a well-ventilated place.

**4) Disposal**

- P501 Dispose of contents/container in accordance with local/regional/national/international regulation

### C. Other hazards which do not result in classification

- Not available

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Trade names and Synonyms	CAS No.	Content(%)
Helium	Helium, refrigerated liquid (cryogenic) liquid ; Helium Gas ; Helium, compressed ; Atomic helium ; o-Helium ; p-Helium ;	7440-59-7	90.0
Methane	Methyl hydride ; Fire damp	74-82-8	5.0
Ethane	Not available	74-84-0	3.0
Ethylene	Acetene ; Bicarburetted hydrogen ;	74-85-1	3.0
Propane	Dimethylmethane ; Propyl hydride ; n-Propane ; Propyldihydride ;	74-98-6	2.0
1-Propene	Methylethene ; Methylethylene ; Propene ; 1-Propene ; 1-Propylene ;	115-07-1	2.0
(Z)-2-Butene	cis-2-butene	590-18-1	1.0
(E)-2-Butene	Not available	624-64-6	1.0
2-Methylbutane	Butane, 2-methyl- (TSCA, DSL, ENCS, AICS, SWISS, PICCS, ASIA-PAC, NZIoC) ; 2-Methylbutane (English, French) (DSL, EINECS, ECL) ; 2-Methylbutan (german) (EINECS) ; 2-metilbutano (spanish) (EINECS) ; ISOPENTAN (german) (SWISS) ; ISOPENTANE (PICCS) ; BUTANE,2-METHYL (PICCS) ; 1,1,2-Trimethylethane ; Borger Isopentane ; Ethyl dimethyl methane ; Exxsol Isopentane S ; iso-Pentane ; Isoamyl hydride ; Methylbutane ; Isopentane ; 2-Methylbutane ; Ethyldimethylmethane	78-78-4	1.0
Butane	N-Butane ; Butyl hydride ; Methylethylmethane ;	106-97-8	1.0
1-Butene	Alpha-butene ; Butene-1 ; Alpha-butylene ; 1-Butylene ; Ethylethylene ; Butylene ; n-Butene ; n-Butylene ;	106-98-9	1.0
Pentane	Amyl hydride ; Normal pentane ; N-Pentane ;	109-66-0	1.0

### 4. FIRST AID MEASURES

#### A. Eye contact

- Do not rub your eyes.
- Immediately flush eyes with plenty of water for at least 15 minutes and call a doctor/physician.
- Get medical attention immediately.

#### B. Skin contact

- Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Wash contaminated clothing thoroughly before re-using.
- Get medical attention immediately.
- Remove contaminated clothing, shoes and isolate.
- Wear gloves when washing the patient, and please avoid contact with contaminated clothing.

#### C. Inhalation contact

- Take specific treatment if needed.
- When exposed to large amounts of steam and mist, move to fresh air.
- Get medical attention immediately.
- If breathing is stopped or irregular, give artificial respiration and supply oxygen.

#### D. Ingestion contact

- Please be advised by doctor whether induction of vomit is demanded or not.
- Rinse your mouth with water immediately.
- Get medical attention immediately.

#### E. Delayed and immediate effects and also chronic effects from short and long term exposure

- Not available

#### F. Notes to physician

- Notify medical personnel of contaminated situations and have them take appropriate protective measures.
- If exposed or concerned, get medical attention/advice.

## 5. FIREFIGHTING MEASURES

### A. Suitable (Unsuitable) extinguishing media

- Avoid use of water jet for extinguishing
- Dry chemical, carbon dioxide, regular foam extinguishing agent, spray

### B. Specific hazards arising from the chemical

- Compressed gas ; Contains gas under pressure; may explode if heated
- May cause cancer
- May cause genetic defects

### C. Special protective actions for firefighters

- Avoid inhalation of materials or combustion by-products.
- Cool containers with water until well after fire is out.
- Do not approach the tank surrounded by fire until it is extinguished.
- In case of conflagration, use automatic fire sprinkler. Major fire may require withdrawal, allowing the object itself to burn.
- Keep unauthorized personnel out.

## 6. ACCIDENTAL RELEASE MEASURES

### A. Personal precautions, protective equipment and emergency procedures

- Do not touch spilled material. Stop leak if you can do it without risk.
- Handle the damaged containers or spilled material after wearing appropriate protective equipment
- Move container to safe area from the leak area.
- Must work against the wind, let the upwind people to evacuate.
- Remove all sources of ignition.

### B. Environmental precautions

- If large amounts have been spilled, inform the relevant authorities.
- Prevent runoff and contact with waterways, drains or sewers.

### C. Methods and materials for containment and cleaning up

- Appropriate container for disposal of spilled material collected.
- Disposal of waste shall be in compliance with the Wastes Control Act
- Large spill : Stay upwind and keep out of low areas. Dike for later disposal.
- Notify the central and local government if the emission reach the standard threshold.

## 7. HANDLING AND STORAGE

### A. Precautions for safe handling

- Avoid contact with incompatible materials.
- Avoid direct physical contact.
- Comply with all applicable laws and regulations for handling
- Dealing only with a well-ventilated place.
- Do not handle until all safety precautions have been read and understood.

### B. Conditions for safe storage, including any incompatibilities

- Avoid direct sunlight.
- Check regularly for leaks.
- Do not apply any physical shock to container.
- Do not apply direct heat.
- Do not use damaged containers.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### A. Exposure limits

- o ACGIH TLV
  - [Helium] : Asphyxia
  - [Methane] : Asphyxia

- [Ethane] : Asphyxia
- [Ethylene] : TWA 200 ppm (Asphyxia)
- [Propane] : Asphyxia
- [1-Propene] : TWA 500 ppm (860 mg/m<sup>3</sup>)
- [(Z)-2-Butene] : TWA, 250 ppm (574 mg/m<sup>3</sup>)
- [(E)-2-Butene] : TWA, 250 ppm (574 mg/m<sup>3</sup>)
- [2-Methylbutane] : TWA, 1000 ppm (2950 mg/m<sup>3</sup>)
- [Butane] : STEL 1000 ppm
- [1-Butene] : TWA, 250 ppm (574 mg/m<sup>3</sup>)
- [Pentane] : TWA, 1000 ppm (2950 mg/m<sup>3</sup>)
- o **OSHA PEL**
  - [Propane] : 1800
  - [Pentane] : 2950

## B. Engineering controls

- Business owner is recommended to maintain below recommended exposure limits for the working place with general exhaust of gas/vapour/mist/fume.

## C. Individual protection measures, such as personal protective equipment

- o **Respiratory protection**
  - Consider warning properties before use.
  - Respiratory protection is ranked in order from minimum to maximum.
- o **Eye protection**
  - Provide an emergency eye wash station and quick drench shower in the immediate work area.
  - Wear primary eye protection such as splash resistant safety goggles with a secondary protection face shield.
- o **Hand protection**
  - Wear appropriate chemical resistant glove.
- o **Skin protection**
  - Wear appropriate chemical resistant protective clothing.
- o **Others**
  - Not available

## 9. PHYSICAL AND CHEMICAL PROPERTIES

A. Appearance	
- Appearance	Not available
- Color	Not available
B. Odor	Not available
C. Odor threshold	Not available
D. pH	Not available
E. Melting point/Freezing point	Not available
F. Initial Boiling Point/Boiling Ranges	Not available
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower Flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Not available
M. Vapour density	Not available
N. Specific gravity(Relative density)	Not available
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

## 10. STABILITY AND REACTIVITY

### A. Chemical Stability

- high-pressure gas; May explode when heated.

**B. Possibility of hazardous reactions**

- Contact with other combustible material may cause fire.

**C. Conditions to avoid**

- Avoid : Accumulation of electrostatic charges, Heating, Flames and hot surfaces
- Avoid contact with incompatible materials and condition.
- Avoid contact with heat, sparks, flame or other ignition sources.

**D. Incompatible materials**

- Not available

**E. Hazardous decomposition products**

- May emit flammable vapour if involved in fire.

**11. TOXICOLOGICAL INFORMATION****A. Information on the likely routes of exposure**

- **Respiratory tracts**
  - Not available
- **Oral**
  - Not available
- **Eye/Skin**
  - Not available

**B. Delayed and immediate effects and also chronic effects from short and long term exposure**

- **Acute toxicity**
  - \* **Oral**
    - Product (ATEmix) : 2000mg/kg < ATEmix <= 5000mg/kg
    - [Pentane] : LD50>2000 mg/kg Rat (ECHA)
  - \* **Dermal**
    - Product (ATEmix) : 2000mg/kg < ATEmix <= 5000mg/kg
    - [2-Methylbutane] : LD50 > 2000 mg/kg Rat (OSHR)
  - \* **Inhalation**
    - Product (ATEmix) : Not available
    - [Methane] : Gas LC50 353553 ppm 4 hr (LC50 500000 2 hr) Mouse (RTECS)
    - [Ethane] : Gas LC50 > 200000ppm/4hr (800000ppm/15min) Rat (Read-across CAS No. 74-98-6)(ECHA), LC50 658 mg/ℓ 4 hr Rat (KOSHA)
    - [Propane] : LC50 142500 ppm/4hr (570000 ppm/15min) Rat (ECHA)
    - [1-Propene] : Gas LC50 50,000 ppm/4 hr Rat (IARC, 1994)
    - [2-Methylbutane] : Steam LC50 = 280 mg/ℓ 4 hr Rat (Hazardous substances: Galogenated hydrocarbons) Bandman A.L. et al., Chimia, 1990.
    - [Butane] : Gas LC50 > 200000ppm 4hr Rat (conversion of 800000ppm 15min) (Read-across CAS No. 74-98-6) (ECHA)
    - [Pentane] : LC50 364 mg/L/4 hr Rat (HSDB, ChemIDPlus)
- **Skin corrosion/irritation**
  - Not available
- **Serious eye damage/irritation**
  - Not available
- **Respiratory sensitization**
  - Not available
- **Skin sensitization**
  - Not available
- **Carcinogenicity**
  - \* **IARC**
    - [Ethylene] : Group 3
    - [1-Propene] : Group 3
  - \* **OSHA**
    - Not available
  - \* **ACGIH**

- [Ethylene] : A4
- [1-Propene] : A4
- [(Z)-2-Butene] : A4
- [(E)-2-Butene] : A4
- [1-Butene] : A4

\* **NTP**

- Not available

\* **EU CLP**

- [Butane] : Carc.1A (butane (containing  $\geq 0.1\%$  butadiene (203-450-8)))

o **Germ cell mutagenicity**

- May cause genetic defects

o **Reproductive toxicity**

- Not available

o **STOT-single exposure**

- Not available

o **STOT-repeated exposure**

- Not available

o **Aspiration hazard**

- Not available

## 12. ECOLOGICAL INFORMATION

### A. Ecotoxicity

o **Fish**

- [Helium] : LC50 12.245 mg/ℓ 96 hr (Estimate)
- [Propane] : LC50 > 100 mg/ℓ 96 hr (Species : Fish TLM) (IUCLID)
- [2-Methylbutane] : LC50 4.26 mg/L 96h (ECHA)
- [Butane] : LC50 27.98 mg/ℓ 96 hr Other (Read across, Estimate)
- [Pentane] : LC50 4.26 mg/ℓ 96 hr Oncorhynchus mykiss (Semi-static, OECD Guideline 203, GLP) (ECHA)

o **Crustaceans**

- [Helium] : LC50 116.827 mg/ℓ 48 hr (Estimate)
- [Methane] : LC50 164.244 mg/ℓ 48 hr (Estimate)
- [Propane] : LC50 52.157 mg/ℓ 48 hr (Estimate)
- [2-Methylbutane] : EC50 = 2.3 mg/ℓ 48 hr Daphnia magna (NITE: IUCLID, 2000)
- [Butane] : LC50 69.43 mg/ℓ 48 hr Daphnia sp. (Read across, Estimate)
- [Pentane] : LC50 9.1 mg/ℓ 48 hr Daphnia magna(static) (ECHA)

o **Algae**

- [Helium] : EC50 66.152 mg/ℓ 96 hr (Estimate)
- [Methane] : EC50 95.717 mg/ℓ 96 hr (Estimate)
- [Propane] : LC50 32.252 mg/ℓ 96 hr (Estimate)
- [(E)-2-Butene] : EC50 14.814 mg/ℓ 96 hr (Estimate)
- [Butane] : EC50 16.47 mg/ℓ 96 hr Green algae (Read across, Estimate)
- [Pentane] : ErC50 10.7 mg/ℓ 72 hr Selenastrum capricornutum(static, OECD Guideline 201, GLP) (ECHA)

### B. Persistence and degradability

o **Persistence**

- [Helium] : log Kow 0.28 (Estimate)
- [Methane] : log Pow 1.09 (ECHA)
- [Ethane] : log Kow 1.81
- [Ethylene] : log Kow 1.13 (ECHA)
- [Propane] : log Kow 2.36
- [1-Propene] : log Kow = 1.77 (ICSC)
- [(Z)-2-Butene] : log Kow 2.33 (ICSC)
- [(E)-2-Butene] : log Kow 2.31 (ICSC)
- [2-Methylbutane] : log Kow=4 (25C)(ECHA)
- [Butane] : log Kow 2.89 (HSDB)
- [1-Butene] : log Kow 2.4
- [Pentane] : log Kow 3.45 (ECHA)

o **Degradability**

- Not available

### C. Bioaccumulative potential

#### o Bioaccumulative potential

- [Helium] : BCF 3.162 (Estimate)
- [Methane] : BCF 1 (HSDB)
- [Propane] : BCF 13 (HSDB)
- [1-Propene] : BCF = 13.18 (IUCLID)
- [(Z)-2-Butene] : BCF 11.99 (Estimate)
- [(E)-2-Butene] : BCF 11.99 (Estimate)
- [Pentane] : BCF 171 (Estimate) (ECHA)

#### o Biodegradation

- [Methane] : 65.7 (%) 35 d (IUCLID)
- [Ethane] : 65.7 (%) 35 day (Aerobic, Microorganism, readily biodegradable)
- [Propane] : 65.7 (%) 35 day
- [1-Propene] : 65.7 %, 35 day (NLM/HSDB)
- [2-Methylbutane] : 71.43% 28 days (ECHA)
- [Butane] : 100% 385.5 hr (Read across, ECHA)
- [Pentane] : 87 (%) 28 day (OECD Guideline 301 F, GLP) (ECHA)

### D. Mobility in soil

- [1-Propene] : Koc 220 (NLM/HSDB)

### E. Other adverse effects

- [Pentane] : Algae(Scenedesmus capricornutum): NOErC(72h) 7.51mg/L (OECD Guideline 201, GLP) (ECHA)

## 13. DISPOSAL CONSIDERATIONS

### A. Disposal methods

- It shall be treated by incineration
- Oil water separation technology shall be applied as pre-waste treatment if it is applicable
- Stabilization and minimization treatment by incineration or similar method can be applied, if more than two kinds of designated wastes are in mixture state and it is impractical to separate them

### B. Special precautions for disposal

- Anyone with business license number who generates industrial wastes shall treat the waste by him/herself or by entrusting to the legal entities who treat the wastes, recycle the wastes of others or install and operate the waste treatment facilities according to the Wastes Control Act
- Dispose of waste in accordance with all applicable laws and regulations.

## 14. TRANSPORT INFORMATION

### A. UN No. (IMDG)

- 1956

### B. Proper shipping name

- COMPRESSED GAS, N.O.S.

### C. Hazard Class

- 2.2

### D. IMDG CODE/IATA DGR Packing group

- Not applicable

### E. Marine pollutant

- Not applicable

### F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.

- EmS FIRE SCHEDULE : F-C (Non-flammable gases)
- EmS SPILLAGE SCHEDULE : S-V (Gases (non-flammable, non-toxic))

## 15. REGULATORY INFORMATION

### A. National and/or international regulatory information

#### o POPs Management Law

- [Helium] : Not applicable
- [Methane] : Not applicable
- [Ethane] : Not applicable
- [Ethylene] : Not applicable
- [Propane] : Not applicable
- [1-Propene] : Not applicable
- [(Z)-2-Butene] : Not applicable
- [(E)-2-Butene] : Not applicable
- [2-Methylbutane] : Not applicable
- [Butane] : Not applicable
- [1-Butene] : Not applicable
- [Pentane] : Not applicable

#### o Information of EU Classification

##### \* Classification

- [Methane] : H220,H280
- [Ethane] : H220,H280
- [Ethylene] : H220,H280,H336
- [Propane] : H220,H280
- [1-Propene] : H220,H280
- [(Z)-2-Butene] : H220,H280
- [(E)-2-Butene] : H220,H280
- [2-Methylbutane] : H224,H304,H336,H411
- [Butane] : H220,H280,H340,H350
- [1-Butene] : H220,H280
- [Pentane] : H225,H304,H336,H411

#### o 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)

- [Ethylene] : Applicable
- [1-Propene] : Applicable

#### o Rotterdam Convention listed ingredients

- Not applicable

#### o Stockholm Convention listed ingredients

- Not applicable

#### o Montreal Protocol listed ingredients

- Not applicable

## 16. OTHER INFORMATION

### A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard communication. It is not intended to constitute performance information concerning the product. 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.
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

### B. Issue date



- 2022-08-30

**C. Revision number and Last date revised**

- 3 times, 2020-01-16

**D. Other**

- This SDS is prepared according to the Globally Harmonized System (GHS).