

# Safety Data Sheet



## 1. Identification of the Substance/Mixture and the Supplier

Supplier : National Institute of Advanced Industrial Science and Technology (AIST)  
 Address : 1-3-1 Kasumigaseki, Chiyoda, Tokyo, Japan  
 Office in Charge : Reference Materials Office, Center for Quality Management of Metrology, National Metrology Institute of Japan (NMIJ)  
 Person in Charge : Person in Charge of Certified Reference Materials  
 Telephone No : +81-29-861-4059 Fax No. : +81-29-861-4009  
 Emergency Contact : Same as above

Prepared on : December 27, 2017

Revised on : August 31, 2022

Reference No. : 4052003

Identification of the Material : Certified Reference Material NMIJ CRM 4052-c Propane

Recommended Use of the Chemical and Restriction on Use : This reference material can be used for calibration of analysis equipment as well as quality control of equipment and validation of analysis method/equipment. Do not use this reference material for other purposes than testing/research.

This CRM is a reference material (specified in the Japanese Industrial Standard (JIS) Q 0030).

## 2. Hazards Identification

GHS Classification : Combustible/flammable gas : Class 1  
 High-pressure gas : Liquefied gas  
 Particular target organ/systemic toxicity (Single exposure) : Class 3 (Anesthetic action)

GHS Label Element :



Signal Word: Danger

Hazard and Toxicity : Liquefied gas; May explode when heated.  
 Highly combustible, flammable gas.  
 May cause drowsiness or dizziness.

Precautionary Statement : [Preventive Measures]  
 Take measures to prevent the container from falling, dropping, etc., and do not handle it roughly.  
 Keep away from ignition sources such as heat/ sparks/open flame/high temperature matters. No smoking.

Use the material in an outdoor or well ventilated place only.  
Avoid inhaling the gas/spray.

[Response]

A fire due to leaked gas: Do not extinguish until the leakage stops. If it is safe and possible to deal with the situation, remove the source of ignition.

If feeling ill: Seek medical advice.

If inhaled: Move to fresh air, take a comfortable posture to ease breathing and rest.

[Storage]

Protect from sunlight and store in a well ventilated area at temperatures below 40 °C

[Disposal]

For content disposal, select a well-ventilated area away from fire and combustible materials, and release the gas slowly.

Dispose of this CRM in accordance with applicable legislation and local government ordinance. Entrust disposal of this CRM to a professional waste disposal company licensed by the prefectural governor.

Inside Japan, return the cylinder of this CRM back to the supplier when it is no longer needed or exceeds its shelf life.

Hazardous and toxic properties not specified above are either not classifiable or not applicable.

### 3. Composition/Information on Ingredients

Single or Compound Product	: Single product
Chemical Name	: Propane
Other Name	: Propylhydride, Dimethylmethane
Content	: 99.99 %
Chemical or Structural Formula	: Molecular formula: C <sub>3</sub> H <sub>8</sub>
Molecular Weight	: 44.11
Reference Number in Gazetted List in Japan	: Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (2)-3 Industrial Safety and Health Act : Published
CAS Number	: 74-98-6

### 4. First-aid Measures

If in Eyes	: Rinse well with clean water. If the irritation in eyes persists or feeling ill, seek medical advice, treatment.
If on Skin	: Rinse well with clean water. Take off the contaminated clothes and shoes, etc. Seek medical advice. Treat cryogenic burn.
If Inhaled	: Move to fresh air and keep warm and rest. Seek medical advice. If

	inhaled large amounts, take measures against oxygen deprivation. If having difficulty breathing, have him/her on pure oxygen. Apply humidified oxygen inhalation. In case of respiration arrest, give artificial respiration.
If Swallowed	: Wash mouth well with water. Seek medical advice.
Anticipated Acute Symptoms and Delayed Symptoms	: Inhalation : Serious drowsiness (the condition that a person is not in a wakeful state or responsive unless vigorous stimulation is applied), asphyxiation. The concentration in the air causes oxygen deficiency accompanied by loss of consciousness or risk of death.  Contact with skin : Cryogenic burn Contact with eyes : Cryogenic burn
Most Important Characteristics and Symptoms	: When inhaling high concentration propane, loses consciousness in breathing. If this condition continues, it results in death.
Measures to be Taken to Protect the Person Applying First Aid	: When handling propane in a place where liquid propane is leaking or spouting out, use protective equipment to protect the skin from contacting the propane.  Ventilate the place where propane is leaking or spouting out because oxygen concentration of the air may be low When the concentration of leaked propane is about 1.8 % to 9.5 % of the air, ventilate well to prevent possible explosion if there is any ignition sources  In case of handling in outdoor workplace, prevent an explosion due to scattering the gas by sprinkling water with spray nozzle, etc.

## 5. Fire-fighting Measure

Extinguishing Media	: In the initial stage of fire extinguishing, use powder, carbon dioxide, powder extinguishing facility or tool.
Prohibited Extinguishing Device	: Straight stream firefighting nozzle should not be used.
Specific Hazards at the Time of Fire	: Highly flammable substance The container may explode by heating. An exploded cylinder may be propelled. May form irritating or toxic gas due to fire. Highly flammable and combustible gas
Specific Extinguishing Measures	: Do not extinguish until leaking has stopped completely. Remove ignition sources if possible and safe to do so. Transfer the container from the fire area if safe to do so. Extinguish from the windward side where there is no gas stagnation and take preventive measures against leakage. If transfer is impossible, spray water onto the container and the periphery to cool down. Continue to cool the container with a large amount of water for after the fire is extinguished.

- Do not water the leaked area or fail-safe device directly. It may freeze.
- Extinguishing activity should be performed from a distance sufficient enough for effective extinguishing.
- To prevent the heating of the peripheral equipment, etc., cool the periphery with water spray.
- If the extinguishing activity causes an increased risk of fire, spray water at the periphery to prevent the fire from spreading further and allow the gas to burn until the container is empty.
- Protecting Fire-Fighting Personnel : Extinguishing activities should be performed on the windward side. Avoid inhaling toxic gases.
- Use protective equipment such as fire-resistant clothing, heat-resistant clothing, protective clothing, breathing apparatus, closed-circuit self-contained oxygen breathing apparatus, rubber gloves, rubber boots, etc.

---

## 6. Accidental Release Measures

- Personal Precautions : If there is an ignition source within the concentration range of 1.8 % to 9.5 % in the air, do not move closer to the area if a safe atmosphere cannot be ensured.
- Ventilate well to prevent asphyxiation. When the leaked liquid vaporizes, it increases in volume about 250-fold and decreases the oxygen concentration in the air.
- Direct contact with liquid propane causes cryogenic burns due to vaporization heat. Use dry leather gloves as necessary.
- Promptly remove ignition sources nearby.
- Keep extinguishing equipment on hand in anticipation of ignition.
- Protective Equipment and Emergency Procedure : If released indoors, ventilate well until the treatment is completed. Use suitable protective equipment to protect the skin from airborne droplets, etc., and avoid inhaling dust and gas.
- Use antistatic protective clothing/shoes, leather gloves. Use an air respirator and protective clothing as necessary.
- Environmental Precaution : There is no established information on environmental impact related to this material.
- Recovery, Neutralization : Adsorb leaked liquid using waste cloth or sand and soil and collect in an empty container to prevent the leaked liquid and vapor from spreading.
- Measures to Prevent Secondary Accident : Remove ignition sources nearby. Close the container valve and cut off gas supply.
- Stop the leakage at the leak source.
- Rope-off the leaked area and restrict access only to authorized persons.
- Propane has a larger specific gravity than the air and, therefore, should be ventilated and dispersed, etc. to prevent possible

stagnation.

---

## 7. Handling and Storage

### Handling

- |  |  |
|--|--|
| Technological Counter Measures.        | <p>: Handle according to the High Pressure Gas Safety Act.</p> <p>Take preventive measures against overturning, dropping, falling, etc. the container. Do not handle roughly.</p> <p>When overturned, the container can be propelled like a rocket due to high-pressure gas spouting resulting from damage, etc. to the container valve.</p> <p>Remove the protective cap and container valve before using.</p> <p>Close the container valve securely first and then reinstall the protective cap after using.</p> <p>First, fit a pressure regulator following the correct procedure. The container valve can then be opened slowly.</p> <p>When opening container valves, stand to the side of the pressure regulator, not in front or behind the regulator.</p> <p>Do not fill the container with the gas. Do not change, erase or peel off the container engrave, label, etc.</p> <p>Except for special use methods, do not use the gas directly from the container. Use a pressure regulator.</p> <p>Use a bubbling solution, such as soapy water, to ensure that the joints, hose, piping, and equipment have no leaks before use.</p> |
| Local Ventilation, General Ventilation | <p>: Sufficient air supply and exhaust treatment should be provided to prevent incomplete combustion.</p> <p>Appropriated countermeasure should be established when using in area where liquefied petroleum gas may stagnate.</p>  |
| Precautions for Safe Handling          | <p>: Do not handle the container roughly, such as overturning, dropping, dragging, etc.</p> <p>Avoid leakage, scattering, etc. and prevent from forming vapor.</p> <p>Prohibit unauthorized persons from entering the handling area.</p> <p>Use appropriate protective equipment to prevent inhalation and contact with eyes, skin, and clothes.</p> <p>Propane forms explosive mixtures with air or oxygen. The explosive range in air is about 1.8 % to 9.5 %, a low lower explosion limit. Therefore, the mixture is highly hazardous and persons handling the gas should be careful to prevent leakage.</p> <p>As a highly flammable gas, use of fire nearby is strictly prohibited.</p> <p>Leave the container equipped with a desorption-protective cap, except during use.</p> <p>Do not use all of the gas, but leave a residual pressure in the container.</p> <p>Inhaling large amounts causes asphyxiation.</p>   |

Storage

- Appropriate Condition : Store the container in a well-drained and ventilated dry place. Do not expose the container to sunlight and store below 40 °C. Do not expose to continuous vibration. Keep away from oxidizers, oxygen, explosives, halogen, compressed air, acid, base, food chemicals, etc. Store in an area that unauthorized persons cannot enter. Post warning signs stating 'FLAMMABLE GAS' or 'LP GAS' conspicuously when storing the container in a container storage area. If a container storage area is established, keep the container separate from toxic gas and oxygen filled containers. Furthermore, do not keep fire, flammable, and ignitable matter within 2 meters of the container storage area, except in an area installed with an appropriate barrier. Promptly return the used container to the department in charge provided in the 1. Identification of the Substance/Mixture and the Supplier. Do not expose to a corrosive atmosphere.
- Safe Packing Material : Container for liquefied petroleum gas specified in the High Pressure Gas Safety Act.

## 8. Exposure Controls/Personal Protection

Administrative level

Not established

Occupational exposure levels (Chemical name) Propane

- ACGIH TLV-TWA(2005) : 1000 ppm
- Japan Society for : Not established

Occupational Health

Recommended

Reference Value(2005)

Facility engineering

- Ventilation, Exhaust : Install explosion-proof local exhaust ventilation system. Beware of oxygen deficiency. When handling indoors, ventilate well to prevent the oxygen concentration becoming under 18 vol%
- Safety Management, Gas Detection : Measuring device, detector  
Install gas-leak alarm that activates the alarm when the gas concentration in the air is under about 0.5 % (1/4 of lower explosion limit).
- Storage Precaution : Ventilate along the floor surface. Seal. Do not keep fire or flammable or ignitable matters. Store the container by stabling with rope or chain, etc. to prevent from overturn.

Protective Equipment

Respiratory Organ	: Use air respirator as necessary.
Hand	: Use dry leather gloves as necessary.
Eyes	: Use protective eye glasses as necessary
Skin and Body	: Clothes appropriate for type of usage, helmet.
Sanitary Requirement	
Wash hands after handling.	

---

## 9. Physical and Chemical Properties

• Appearance, etc.	: Liquefied gas
• Color	: Colorless
• Odor	: Odorless
• pH	: No data
• Melting point	: -189.69 °C
• Boiling point	: -42.04 °C
• Flashing point	: -104.4 °C
• Explosive range	: Lower limit 2.1 vol%, upper limit 9.5 vol%
• Vapor pressure	: 1.275 MPa (40 °C)
• Relative vapor density(Air=1)	: 1.6
• Specific gravity or bulk specific gravity	: 0.5
• Solubility	: 62.4 mg/L (25 °C)(Water) Soluble in ether, ethanol and in other organic solvents.
• <i>n</i> -Octanol/water partition coefficient (Log Po/w)	: 2.36
• Auto-ignition temperature	: 450 °C
• Upper/lower flammability	: Ignitable if the mixture with air is less than 13 %.
• Viscosity	: 0.0081 MPa/s (20 °C)

---

## 10. Stability and Reactivity

### ◇Stability

- Stable under normal condition
- Ignition sources such as high temperature surface, sparks or open flame, etc. cause ignition.
- When emitting gas, forms explosive mixture gas which spreads in the periphery.
- Stable substance, but begins degrading at about 700 °C, and forms ethylene and propylene.

### ◇Reactivity

- Reacts violently with oxidizing substance.
- Explodes violently with chlorine dioxide.

### ◇Conditions to Avoid

- Contact with sunlight, heat, oxidizer.
- Avoid using natural rubber, butyl rubber as a material.

### ◇Hazardous Decomposition Product

- Forms toxic gases such as carbon monoxide, carbon dioxide, etc. due to combustion at

the time of fire.

## 11. Toxicological Information

Acute Toxicity	: Based on the following description, Inhalation guinea pig LC50(2H) > 55000 ppm (4H corresponding value: > 38890 ppm) (ACGIH 7th, 2001), considered unclassifiable.								
Skin Corrosivity /Irritation	: From the description in ACGIH (7th, 2001), only temporal minor degree erythema on humans and primary skin irritation can be disregarded, considered unclassifiable.								
Particular Target Organ /Systemic Toxicity (Single Exposure) Other	: From the description in ACGIH (7th, 2001), observed anesthetic action to humans, Classified as 3 (anesthetic action) Beware of gas leakage; ventilate the room well to prevent asphyxiation due to oxygen deficiency under high concentration conditions. Oxygen concentration (vol%) and effect <table border="0" style="margin-left: 20px;"> <tr> <td style="padding-right: 10px;">Less than 18</td> <td>Shows initial stage oxygen deficiency.</td> </tr> <tr> <td style="padding-right: 10px;">16 to 12</td> <td>Symptoms such as increased pulse and respiration rate, mental concentration requires effort, work involving detailed muscle movement is difficult, headache, etc.</td> </tr> <tr> <td style="padding-right: 10px;">10 to 6</td> <td>Unconscious, central nervous system damage, convulsion, coma, respiratory arrest, and cardiac arrest in 6 to 8 min.</td> </tr> <tr> <td style="padding-right: 10px;">6 or less</td> <td>At extremely low concentrations, fainting, coma, respiratory arrest, and convulsion can occur instantaneously upon breathing, with death in about 6 min.</td> </tr> </table>	Less than 18	Shows initial stage oxygen deficiency.	16 to 12	Symptoms such as increased pulse and respiration rate, mental concentration requires effort, work involving detailed muscle movement is difficult, headache, etc.	10 to 6	Unconscious, central nervous system damage, convulsion, coma, respiratory arrest, and cardiac arrest in 6 to 8 min.	6 or less	At extremely low concentrations, fainting, coma, respiratory arrest, and convulsion can occur instantaneously upon breathing, with death in about 6 min.
Less than 18	Shows initial stage oxygen deficiency.								
16 to 12	Symptoms such as increased pulse and respiration rate, mental concentration requires effort, work involving detailed muscle movement is difficult, headache, etc.								
10 to 6	Unconscious, central nervous system damage, convulsion, coma, respiratory arrest, and cardiac arrest in 6 to 8 min.								
6 or less	At extremely low concentrations, fainting, coma, respiratory arrest, and convulsion can occur instantaneously upon breathing, with death in about 6 min.								

## 12. Ecological Information

Degradability, Concentration	• No data available
Bioaccumulation	• No data available
Ecotoxicity	• No data available

## 13. Disposal Considerations

Residual Waste	: Do not emit into the atmosphere in the liquid form. If there is no alternative to emitting as a gas, emit the gas gradually into an airy atmosphere outdoors with no fire by making sure that the ground level concentration is less than 0.5 %. Do not dispose of the container.
----------------	---



Contaminated Container and Packaging : Return the used empty and unnecessary containers to the relevant department, as described in '1. Chemical Substances, etc. and Manufacturer Information'

## 14. Transport Information

### International Regulation

Marine Regulation Information : Comply with IMO regulations.

UN No. : 1978

Proper Shipping Name : PROPANE

Class : 2.1

Marine Pollutant : Not applicable

Aviation Regulation : Comply with ICAO/IATA regulations

### Information

UN No. : 1978

Proper Shipping Name : PROPANE

Class : 2.1

### National regulation

Land Regulation Information : Comply with the regulations on High Pressure Gas Safety Act

Maritime Regulation : Comply with the regulations on Ship Safety Act.

### Information

UN No. : 1978

Proper Shipping Name : PROPANE

Class : 2.1

Marine Pollutant : Not applicable

Aeronautical Regulation : Comply with the regulations on Civil Aeronautics Act

### Information

UN No. : 1978

Proper Shipping Name : PROPANE

Class : 2.1

### Precautions

: Transport according to High Pressure Gas Safety Act and handle with care by keeping in mind that this mixture gas is a reference material. Handle with care to prevent the filled container from shock. Take necessary measures to prevent the container overturning, valve damage, etc. when transporting. Do not confuse with hazardous materials regulated by the Fire Service Act. Secure the container to protect from moving, overturning, impact, friction, etc. When moving, keep the container at less than 40 °C. Particularly in summer, cover to prevent the temperature from rising. Keep away from fire, heat, and direct sunlight. Avoid direct contact with steel parts.

Do not load the container with heavy objects.  
Post a conspicuous warning sign labeled 'High Pressure Gas' on any vehicle transporting the containers. Appropriate fire extinguishing equipment and tools for responding to a possible emergency situation should be loaded into the same vehicle.  
It is necessary to have a yellow card during transportation.

---

## 15. Regulatory Information

- ◇Industrial Safety and Health Act
  - Hazardous, combustible gas (Enforcement Ordinance Appendix No.1, 4)
- ◇High Pressure Gas Safety Act
  - Liquefied gas (Law Article 2-3)
- ◇Law Concerning the Securing of Safety and the Optimization of Transaction of Liquefied Petroleum Gas
  - Liquefied Petroleum Gas (Law Article 2)
- ◇Ship Safety Act
  - High Pressure Gas (Regulation Article 2-3 Notification of dangerous goods Appendix No. 1)
- ◇Civil Aeronautical Act
  - High Pressure Gas (Regulation Article 194 Notification of dangerous goods Appendix No. 1)
- ◎ **This SDS is originally prepared for the use of the material in Japan, thus the stated laws and regulations are stipulated and carried out in Japan. The use of the material in other countries should be referred to and by application of the relevant laws and regulations of the country in which the material will be used.**

---

## 16. Other Information

### Other

The information in this document is not intended to be exhaustive and is based on currently available information and data. The measures given in this document are applicable only to normal handling conditions. When handling this reference material under special conditions etc., it is recommended to take safety measures appropriate to each specific application and context of use. This document is intended to provide information and not intended to guarantee anything in handling this reference material.

---