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
Person in Charge	:	Certified Reference Material Staff
Telephone No.	:	+81-29-861-4059 Fax No. : +81-29-861-4009
Emergency Contact	:	Same as above
		Prepared on : May 14, 2019
		Revised on : August 31, 2022
		Reference No. : 4407001
Identity of Substance/Mixture	:	Certified reference material NMIJ CRM 4407-a Hexane in methane
Recommended Use and Restrictions on Use	:	This reference material can be used for calibration of analysis 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	:	Category 1
	High-pressure gas	:	Compressed gas
GHS label element	:		

Signal word	:	Danger
Hazards Statement	:	Extremely combustible/flammable gas Gas under pressure: May explode if heated
Precautionary statement	:	[Safety Precaution] Keep away from ignition sources such as heat, sparks, open flames and hot surfaces. No smoking. [First-Aid Measures] Leaking gas fire: Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources, if safe to do so. [Storage] Store in accordance with High Pressure Gas Safety Act. Protect container from direct sunlight. Keep away from flames. Store in a well-ventilated place at temperatures of 0 °C to 40 °C. [Disposal] Return this reference material back to the function in charge given in "1. Identification of the Substance/Mixture and the Supplier" when it becomes no longer necessary to use it or it becomes beyond its shelf life.

The other hazards than the above do not result in classification or are not classifiable.

3. Composition/Information on Ingredients

Substance or mixture	:	Mixture
Ingredient 1		
Chemical name	:	Methane
Synonym	:	Marsh gas
Chemical formula	:	CH_4
Molecular weight	:	16.04
CAS number	:	74-82-8
Content	:	99 % or more
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (2)-1 Industrial Safety and Health Act : (2)-1
Ingredient 2		
Chemical name	:	Hexane
Synonym	:	*n*-Hexane
Chemical formula	:	C_6H_{14}
Molecular weight	:	86.18
CAS number	:	110-54-3
Content	:	509 μmol/mol
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (2)-6 Industrial Safety and Health Act : (2)-6

4. First-aid Measures

If inhaled	:	Remove victim to fresh air and keep at rest and warm. Get medical advice/attention if you feel unwell.
If on skin	:	Rinse with clean water thoroughly. Remove contaminated clothing, shoes, etc. If skin irritation or rash occurs: Get medical advice/attention.
If in eyes	:	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
If swallowed	:	Rinse mouth with water thoroughly. Call a doctor/physician.
Most Critical Characteristic and Symptom of Expected Acute and Delayed Symptom	:	If inhaled: Suffocation; If the concentration in the air is high: Causes oxygen deficiency with risk of loss of consciousness or death. If on skin: Frostbite
Protection of First-Aid Responder	:	Wear personal protective equipment.

5. Fire-fighting Measures

Extinguishing media	:	In the early stages of fire, use powder, carbon dioxide, dry chemical extinguisher/tool. Water spray, Water fog
Unusable extinguishing media	:	Direct water jet
Fire-Specific Hazards	:	May ignite easily. May explode, if heated. Exploded cylinder may fly or its fragments may be splattered. In case of fire: May emit irritating or highly toxic gas. Extremely combustible and flammable gas
Specific Fire-Fighting Method	:	Do not extinguish, unless leak can be stopped safely. Eliminate all ignition sources, if safe to do so. Move containers from fire area if this can be done without risk. Fight fire upwind from a place with no gas stagnation, and take measures to prevent leak. If containers are immovable, cool containers and their surroundings with water spray. Cool containers thoroughly with plenty of water even after fire extinction. Do not spray water directly to leaking points or safety devices. They may get frozen. Fight fire with normal precautions from a reasonable distance. Cool surrounding facilities, etc. with water fog/spray to prevent them from being heated due to radiation heat. If fire-fighting is expected to intensify risks based on the consideration to surrounding and leaking situations: Allow fire to burn until container gets empty while spraying water to surroundings to prevent fire spreading.
Protection of Fire-Fighters	:	Fight fire upwind to avoid breathing hazardous gas. Use personal protective equipment such as fire protection clothing, heat-resistant clothing, protective clothing, compressed air open-circuit self-contained breathing apparatus, circulating oxygen respirator, rubber gloves, and rubber boots.

6. Accidental Release Measures

Personal precautions	:	Remove potential ignition sources from surrounding areas promptly. Make fire extinguishing media/equipment available to prepare for potential ignition. Use appropriate personal protective equipment to avoid contact with skin and eyes and contamination of personal clothes.
Protective equipment and emergency procedure	:	Ventilate the affected areas thoroughly, if it is in an indoor environment, until the clean-up operation is completed. Use appropriate personal protective equipment during the operation to avoid skin contact of splash etc. and inhalation of dust and gas.
Environmental precaution	:	No data available
Recovery and Neutralization	:	No data available
Measures to prevent secondary accident	:	Eliminate all ignition sources promptly (No smoking or sparks in vicinity). Prevent spillages/leaked materials from entering sewers, drainage

systems, basement rooms and confined space.
Do not spray water directly to spillage or its sources.
Maintain the restricted area until gas diffuses.

7. Handling and Storage

Handling

Technological counter measures	:	Strict ban on fire. Keep away from hot surfaces and sparks. Use local ventilation system.
Local ventilation/ general ventilation	:	If vapor/mist is emitted: Seal the emission source and install local ventilation system。
Precautions for safe handling	:	Avoid rough handling such as knocking over, dropping, giving a shock to and dragging container. Prevent this reference material from leaking, overflowing and splashing. Do not allow vapor to be emitted. Keep container tightly closed after using this reference material. Wash hands, face, etc. thoroughly and gargle after handling. Restrict drinking, eating and smoking to a designated area. Do not bring gloves and other contaminated personal protective equipment into staff room. Make a place handling this reference material a restricted area to keep out unauthorized people. Wear appropriate personal protective equipment to avoid inhalation and contact with eyes, skin and clothing. Use local ventilation equipment in indoor handling areas.

Storage

Appropriate Storage Conditions	:	Protect container from direct sunlight. Store in well-ventilated place at temperatures of 0 °C to 40 °C. Keep away from flames.
Safe packing material	:	Use containers specified by High-Pressure Gas Safety Act and UN Model Regulations.

※ See the Certificate for the details on appropriate storage conditions and instructions for use as a reference material.

8. Exposure Controls/Personal Protection

Threshold Limit Value
Not specified

Occupational exposure limit (Methane)

・ACGIH TLV-TWA	:	1000 ppm
・Values recommended by Japan Society for Occupational Health	:	Not specified

Occupational exposure limit (Hexane)

・ACGIH TLV-TWA	:	50 ppm (Skin)
・Values recommended by Japan Society for Occupational Health	:	40 ppm 140 mg/m^3 (Skin absorption)

Facility engineering control

Ventilation, exhaust	:	Install explosion-proof local ventilation system.
Safety Control/Gas Detection	:	Measuring equipment, Detecting tube
Storage Precautions	:	Keep this reference material sealed. Keep away from combustible and reducing substances and strong oxidizers.

Personal Protective Equipment

Respiratory organ	:	Gas mask against organic gas, Compressed air open-circuit self-contained breathing apparatus
Hand	:	Protective gloves
Eyes	:	Safety goggles
Skin and body	:	Protective clothing, Face shield

Hygiene Controls

Handle this reference material in accordance with the industrial health and safety codes.

9. Physical and Chemical Properties

Appearance, etc.	:	Compressed gas
Color	:	Colorless transparent
Odor	:	Odorless
pH	:	No data
Melting point	:	−183 °C
Boiling point	:	−161 °C
Flashing point	:	No data
Explosive range	:	Lower limit: 5 vol%, upper limit: 15 vol%
Vapor pressure	:	147 kPa (15 °C)
Relative vapor density (Air=1)	:	0.6
Specific gravity or bulk specific gravity	:	0.466 (−164 °C)
Solubility	:	33 mL/L in water (20 °C) Soluble in alcohol, ether, and other organic solvents.
n-Octanol/water partition coefficient (Log Po/w)	:	1.09
Auto-ignition temperature	:	537 °C
Decomposition temperature	:	No data available
Flammability	:	No data available

10. Stability and Reactivity

Stability	:	Ignites if in contact with hot surfaces, sparks or open flames. Liquid hexane exposed to the air transitions to gaseous state extremely fast. When this reference material emits gases, large quantity of cold fog and explosive gas mixtures are generated rapidly, and the gas mixtures spread around.
Reactivity	:	Reacts with strong oxidizers.
Hazardous Reactivity	:	Causes fire or explosion if methane is in contact with fluorine, chlorine, bromine, iodine, bromine pentafluoride, chlorine trifluoride, trioxygen difluoride or dioxygen difluoride.

Conditions to avoid	:	Hot surfaces, Sparks, Open flames
Incompatible materials	:	Strong oxidizers, Fluorine, Chlorine, Bromine, Iodine, Bromine pentafluoride, Chlorine trifluoride, Trioxygen difluoride, Dioxygen difluoride
Hazardous decomposition products	:	Emits toxic gases such as carbon monoxide and carbon dioxide if combusts in case of fire.

11. Toxicological information

Acute Toxicity		Inhalation (Gas) Mouse LC50 (2 hours) > 500000 ppm
Skin Corrosion/ Irritation	:	No skin irritation
Serious Eye Damage/ Eye Irritation	:	No eye irritation
Sensitization - Respiratory	:	Not classifiable due to insufficient data
Sensitization - Skin	:	Not classifiable due to insufficient data
Germ Cell Mutagenicity	:	Not classifiable due to insufficient data
Carcinogenicity	:	Not classifiable due to insufficient data
Reproductive Toxicity	:	Not classifiable due to insufficient data
Influence by and via lactation	:	Not classifiable due to insufficient data

※ The toxicological information is prepared based on the information on the raw materials since the information on the mixture is not available.
Under normal conditions, this reference material is stable and has no such risk as elution of hazardous additives. In case of special handling such as handling at high temperatures, however, sufficient safety precautions must be taken.

12. Ecological Information

Hazardous to the aquatic environment, short-term (Acute)	:	No data available
Hazardous to the aquatic environment, long-term (Chronic)	:	No data available
Ecotoxicity	:	No data available
Persistence and Degradability	:	No data available
Bioaccumulation	:	No data available
Mobility in soil	:	No data available
Ozone depletion potential	:	No data available

13. Disposal Considerations

Residual waste	:	Dispose of high-pressure gas in accordance with the Regulation on Safety of General High-Pressure Gas of the High-Pressure Gas Safety Act.
Contaminated container and package	:	Return this reference material back to the function in charge given in "1. Identification of the Substance/Mixture and the Supplier" when it becomes no longer necessary to use it or it becomes beyond its shelf life. Users must not dispose of containers at their discretion since containers must be disposed of by their owner in accordance with relevant laws and regulations.

14. Transport Information

UN Number	:	1971
UN Classification	:	Class 2.1
Material name	:	METHANE (COMPRESSES)
Container grade	:	-
ICAO/IATA	:	Hazard Class 2.1, UN 1971
Marine pollutant	:	Not applicable
Precautions	:	Transport this reference material carefully while keeping it away from direct sunlight and fire and preventing accidental release due to falling, being knocked over, etc.

15. Regulatory Information

Industrial Safety and Health Act	:	Dangerous goods/Flammable gas (Enforcement order, Appendix 1-5)
High Pressure Gas Safety Act	:	Compressed gas (Article 2-1) Flammable gas (General High-Pressure Gas Safety Regulation Article 2-1)
Civil Aeronautical Act	:	Compressed gas (Regulation Article 194 Notification of dangerous goods Appendix No. 1)
Ship Safety Law	:	High Pressure Gas (Regulation Article 3 Notification of dangerous goods Appendix No. 1)
Act on Port Regulations	:	Other dangerous goods / high pressure gas (Article21-2)
Road act	:	Restriction on the passage of vehicles (Article 19-13 of the Enforcement Order, Public Notice of Japan Highway Ownership and Debt Repayment Organization No. 12, Appended Table 2)

◎ **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

Others

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.