

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
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Emergency Contact : Same as above

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Reference No. : 4403001

Identity of : Certified reference material NMIJ CRM 4403-a
Substance/Mixture : Sulfur Hexafluoride and Tetrafluoromethane in Nitrogen (Emission Level)
Recommended Use : This certified reference material (CRM) is for use in calibration of
of the Chemical and analytical instruments. Do not use this reference material for other
Restriction on Use purposes than testing/research.

2. Hazards Identification

GHS classification

Oxidizing gas	: Not classified
Gas under pressure	: Compressed gas
Acute toxicity (Oral)	: Not applicable
Acute toxicity (Dermal)	: Not applicable
Acute toxicity (Inhalation, gas)	: Not classified
Skin corrosivity/irritant	: Not applicable
Severe eye damages/eye irritant	: Not applicable
Respiratory sensitization	: Not applicable
Skin sensitization	: Not applicable
Germ-cell mutagenicity	: Not applicable
Carcinogenicity	: Not applicable
Reproductive toxicity	: Not applicable
Specific target organ toxicity/systemic toxicity (Single exposure)	: Not applicable
Specific target organ toxicity /systemic toxicity (Repeated exposure)	: Not applicable

GHS label element:



Signal word: Warning

Hazards Statement :	Gas under pressure: May explode if heated
Other Hazards Statement :	In case of inhalation of high-concentration nitrogen gas: May die from deficiency of oxygen. May cause eye damage or loss of vision if gas is blown out from container of gas under pressure and caught in eyes.
Precautionary Statement :	[Precaution] Use in a well-ventilated area. Wear personal protective equipment. [Action] If inhaled: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a doctor/physician. [Storage] Protect from sunlight and store in a well-ventilated place. [Disposal] Dispose of contents little by little in a well-ventilated place free from fire and combustible materials so as not to induce risks. 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 when 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 Name	: Mixture Certified reference material NMIJ CRM 4403-a Sulfur Hexafluoride and Tetrafluoromethane in Nitrogen (Emission Level)
Ingredient 1	
Chemical name	: Nitrogen
Synonym	: -
Chemical formula	: N ₂
Molecular weight	: 28.01
CAS number	: 7727-37-9
Content	: About 99.9 %
Reference Number in Gazetted List in Japan	: Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. :- : Industrial Safety and Health Act :-
Ingredient 2	
Chemical name	: Sulfur hexafluoride
Synonym	: -
Chemical formula	: SF ₆
Molecular weight	: 146.06
CAS number	: 2551-62-4
Content	: About 100 μmol/mol (0.01 %)
Reference Number in Gazetted List in Japan	: Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (1)-340

Ingredient 3

Chemical name	:	Tetrafluoromethane
Synonym	:	Perfluoromethane, carbon tetrafluoride, Freon-14
Chemical formula	:	CF ₄
Molecular weight	:	88.01
CAS number	:	75-73-0
Content	:	About 100 μmol/mol (0.01 %)
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (1)-131、 (2)-52
		Industrial Safety and Health Act : Published
Hazardous Component	:	Nitrogen (asphyxiating gas)

4. First-aid Measures

If inhaled	:	Remove victim to fresh air and keep at rest and warm. If you feel unwell, get medical advice/attention.
If on skin	:	Even if exposed to atmospheric-pressure nitrogen gas: No need to get medical advice/attention in particular. If skin irritation occurs: Get medical advice/attention.
If in eyes	:	If exposed to blown-out gas: Keep eyes cool and immediately get medical advice/attention. If eye irritation persists: Get medical advice/attention.
If swallowed	:	Rinse mouth. If you feel unwell: Get medical advice/attention.
The Most Critical Characteristics and Symptoms of Expected Acute Symptoms and Delayed Symptoms	:	If inhaled (compressed gas): Loss of consciousness, Sense of physical weakness, Suffocation In case of high concentration in air: Deficiency of oxygen induces risks of loss of consciousness or death.
Protection of First-Aid Responder	:	Measure oxygen concentration when entering affected area. Since oxygen concentration in air may be decreased, ventilation must be provided and personal protective equipment for breathing such as compressed air open-circuit self-contained breathing apparatus must be used as necessary.

5. Fire-fighting Measures

Extinguishing Media	:	Water fog, Foam extinguishing agent, Dry chemical extinguisher, Carbon dioxide, Dry sands
Unsuitable extinguishing media	:	Direct water jet
Fire-Specific Hazards	:	Container may explode if heated. Burst container may fly.
Specific Fire-Fighting Method	:	Move containers away from fire if this can be done without risk. Keep cooling container thoroughly with plenty of water even after extinction. Do not spray water directly to gas leaking point or safety device, which may make them frozen.

- Protection of Fire-Fighters : Only experts are allowed to handle damaged container.
: Fight fire upwind in order to avoid breathing hazardous gas.
Wear personal protective equipment such as fireproof clothing, heat-resistant clothing, protective clothing, compressed air open-circuit self-contained breathing apparatus, and compressed oxygen closed-circuit self-contained breathing apparatus.

6. Accidental Release Measures

- Personal Precaution : Wear appropriate personal protective equipment (See “8. Exposure Controls/Personal Protection” during the operation to avoid contact with eyes and skin and inhalation of gas.
Do not touch or walk in leaked materials
Immediately designate restricted leakage area with appropriate distance taken in every direction.
Keep out unauthorized people.
Stay upwind.
Ventilate leakage area.
Maintain the restricted area until gas diffuses.
- Personal Protective Equipment and Emergency Procedures : Ventilate affected areas thoroughly, if it is in an indoor environment, until the clean-up operation is completed.
Wear appropriate personal protective equipment (See “8. Exposure Controls/Personal Protection”) during the operation to avoid contact with eyes and skin and inhalation.
- Environmental Precautions : No environmental effects
- Recovery and Neutralization : Stop leakage if safe to do so.
- Prevention of Secondary Disaster : Prevent leaked materials from entering sewers, drainage systems, basement rooms or confined space.
Mark the restricted area with rope etc. to keep out unauthorized people.
Carry out the clean-up operation from the upwind side and make people on the downwind side evacuate.

7. Handling and Storage

- Handling
- Engineering Precautions : Strict ban on fire.
Keep away from hot surfaces and sparks and avoid contact with strong oxidizers.
Use local ventilation equipment.
- Local and General Ventilation : Provide local and general ventilation stipulated in “8. Exposure Controls/Personal Protection.”
- Precautions for Safe Handling : Avoid rough handling such as knocking over, dropping, giving a shock to and dragging container.
Keep container tightly closed after using this reference material.
Take off removable protection cap before use. Keep removable protection cap firmly in place when not in use
Restrict drinking, eating and smoking to a designated area.
Make a place handling this reference material a restricted area to keep out unauthorized people.

Use local ventilation equipment in indoor handling areas.

Storage

- Appropriate Storage Conditions : Store in designated container storage area for flammable gas and toxic gas. Store fully-charged containers separately from containers with residual gas.
Keep away from combustible materials.
Store in a well-ventilated place.
Keep away from flame and sparks. Protect from fire flakes.
Do not store in the vicinity of electric wires or ground wires.
Store in a well-drained and well-ventilated dry place.
Protect from exposure to corrosive ambience or continuous vibration.
Protect from direct sunlight and keep temperatures at 40 °C or below.
Store locked up.
- Incompatible Substances : -
- Safe Container Packaging Material : Use container stipulated in the High Pressure Gas Safety Act and the United Nations Recommendations on the Transport of Dangerous Goods.

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

8. Exposure Controls/Personal Protection

Administrative levels

Not established

Occupational exposure limit (Sulfur Hexafluoride and Tetrafluoromethane in Nitrogen)

- ACGIH TLV-TWA : Suffocation gas
- Japan Society for Occupational Health Recommended Reference Value : Not established

Facility engineering control

- Ventilation, exhaust : Local ventilation system or General ventilation system
- Safety management, gas detection : Measuring equipment, Detecting

- Storage precaution : Keep away from direct sunlight in a well-drained and well-ventilated area.

Protective equipment

- Respiratory organ : Wear appropriate respiratory protective equipment such as air respirator if necessary.
- Hand : Wear leather gloves etc.
- Eyes : Wear eye / face protection such as safety goggles.
- Skin and body : Wear appropriate protective equipment such as safety shoes.

Hygiene Controls

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

9. Physical and Chemical Properties

As the ingredients are mostly nitrogen, the properties of nitrogen are described.

Appearance, etc.	: Compressed gas
Color	: Colorless transparent
Odor	: Odorless
pH	: No data
Melting point	: -210 °C
Boiling point	: -196 °C
Flashing point	: Nonflammable
Explosive range	: Nonflammable
Vapor pressure	: No data
Relative vapor density(Air=1)	: 0.967
Specific gravity or bulk specific gravity	: 1.25 kg/m ³ (0 °C, 101.3 kPa)
Solubility	: 1.52 mL/100 mL H ₂ O (20 °C, 101.3 kPa)
<i>n</i> -Octanol/water partition coefficient (Log P _{o/w})	: log P = 0.67
Auto-ignition temperature	: -
Decomposition temperature	: -
Flammability	: Nonflammable

10. Stability and Reactivity

Stability	: Stable under normal condition
Possibility of hazardous reactions	: When heated, pressure rise occurs with the risk of explosion. Suffocation gas
Conditions to avoid	: Heat
Incompatible materials	: No data
Hazardous decomposition products	: No data

11. Toxicological information

Acute toxicity	Oral: No data Skin: No data
Skin corrosivity/irritation	: No data
Severe damage to eyes/ eye irritation	: No data
Respiratory sensitization	: No data
Skin sensitization	: No data
Germ cell mutagenicity	: No data
Carcinogenicity	: No data
Reproductive toxicity	: No data
Specific organ toxicity/(single exposure)	: No data Nitrogen is present in the air at a high concentration (80% or more), and is a simple asphyxia without any other physiological effects from

toxicological viewpoint (ACGIH (2001)).

Specific organ : No data
toxicity/(repeated exposure)

12. Ecological Information

Hazardous to the aquatic environment, short-term (Acute) : No data
Hazardous to the aquatic environment, long-term (Chronic) : No data
Ecotoxicity : No data
Persistence and Degradability : No data
Bioaccumulation : No data

13. Disposal Considerations

Residual waste : Return the unnecessary cylinder to the gas supplier. Incinerate in an incinerator equipped with scrubber. Dispose of this reference material in accordance with applicable legislation and local government ordinance. When the above-mentioned treatments are not possible, entrust disposal of residual waste to a professional waste disposal company licensed by prefectural governor.

Contaminated container and package : 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 used empty and unnecessary cylinders to the office in charge shown in "1. Identification of the Substance/Mixture and the Supplier", when it is no longer needed or exceeds its shelf life. The owner of the cylinder is National Institute of Advanced Industrial Science and Technology (AIST). The User must not dispose of cylinder without the owner's consent.

14. Transport Information

UN Number : 1066 (Nitrogen)
UN Classification : Class 2.2 (Nitrogen)
Material name : NITROGEN COMPRESSED
Container grade : -
ICAO/IATA : Class 2.2 (Nitrogen)
Marine pollutant : -
Precautions : Transport this reference material carefully while keeping it away from direct sunlight and fire and preventing accidental release due to falling, overturning, etc.

15. Applicable Laws and Regulations

- ◇High Pressure Gas Safety Act
 - Compressed gas (Article 2-1)
 - Inert gas (general high pressure gas safety regulation Article 2-4)
 - ◇Civil Aeronautical Act:
 - High Pressure 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 (Article 21-2)
 - ◇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.**
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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.
