

# 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 : June 6, 2012

Revised on : June 6, 2018

Arrangement number : 3404003

Identity of Substance/Mixture : Certified reference material NMIJ CRM 3404-c  
Oxygen  
 Recommended Use of the Chemical and Restriction on Use : This reference material can be used, in calibration of oxygen concentration in standard gases. Do not use this reference material for other purposes than testing/research.

## 2. Hazards Identification

GHS classification : Oxidizing Gas : Category 1  
 Gas Under Pressure : Compressed gas

GHS labeling element :



Signal word : Danger  
 Hazard and toxicity information : Oxidizing substance; may cause or contribute to combustion.  
 Pressurized gas; may explode when heated.  
 Important hazards and effects : Inhalation of concentrated oxygen gas may lead to adverse effects on human health. Gas blowout from the high-pressure gas cylinder may cause damage to eyes or loss of vision.  
 Cautionary statement : [Safety measures]  
 Do not eat, drink, or smoke when using this product.  
 Do not use grease or oil on pressure-reducing valves.  
 Use only outdoors or in a well-ventilated area.  
 Do not inhale the gas.  
 Keep the product away from combustible materials.  
 Keep the product away from fire.  
 [Emergency measure]  
 In case of fire, if possible and safe, stop the gas leakage.  
 In case of inhalation of the gas in large amounts, immediately

remove the exposed person to fresh air. Seek medical attention if needed.

[Storage]

Keep out of sunlight in a well-ventilated area below 40 °C.

Separate the product from combustible and toxic gases.

Do not place combustible materials near the storage site.

Keep the product away from fire and electric wiring.

[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 to the supplier when it is no longer needed or exceeds its shelf life.

Hazards not mentioned above are either not classifiable or not applicable.

### 3. Composition/Information on Ingredients

Substance or mixture	:	Substance
Chemical name	:	Oxygen
Amount	:	100 %
Chemical formula or structural formula	:	O <sub>2</sub>
Molecular mass	:	32.00
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 : -
CAS number	:	7782-44-7
Hazardous component	:	Oxygen

### 4. First-aid Measures

Eye contact	:	If eyes are exposed to blown-out oxygen gas, cool them by flushing with cold water and immediately seek medical attention.
Skin contact	:	When exposed to the ambient pressure of oxygen gas, no medical care is required.
Inhalation	:	When concentrated oxygen gas has been inhaled and the exposed person shows symptoms of poisoning, immediately remove the person to fresh air. Loosen the clothing, wrap them up in a blanket to keep warm, and provide medical attention to them.
Ingestion	:	-
Estimated acute and late symptom	:	-

- Most important characteristics and symptoms : -
- Protection of first-aiders : If oxygen gas leaks or blows out, oxygen concentration may increase in the air around the site. Ventilate the area and wear a respiratory protective device such as a respirator if needed.

## 5. Fire-fighting Measures

- Extinguishing media : Oxygen is a combustion-supporting gas. Use extinguishing media for the surrounding fire.  
To prevent the cylinder from heating, cool it with water.  
Oxygen is an oxidizing agent that becomes stronger when fire is present in the immediate area. Therefore, stop supplying oxygen as soon as possible.  
If oxygen gas blows out, dry extinguishing agent or carbonic anhydride will not have any effect on the fire.
- Specific hazards with regard to fire-fighting : Even materials that do not burn in air often burn in oxygen gas.  
Keep surrounding objects as far from the gas as possible.
- Specific methods of fire-fighting : The inner pressure of the cylinder will increase if exposed to fire, leading to failure of the safety device and blowout of oxygen gas.  
If the inner pressure increases rapidly, the cylinder may burst. If the cylinder valve is broken, the cylinder can be propelled like a rocket. If possible, carry the cylinder to a safe place. If not, spray water from the windward side as far from the cylinder as possible to cool it down.
- Protection for firefighters : Wear refractory gloves and fireproof clothing, and work from the windward side as far from the fire as possible.

## 6. Accidental Release Measures

- Personal precautions : Work clothes may catch fire. Prevent exposure to oxygen gas.
- Protective equipment and emergency measures : To reduce the risk of fire, open windows and doors to ventilate. If a ventilation system is available, activate it immediately for ventilation.  
If a large amount of gas leaks continuously, surround the gas-leak area with ropes and monitor it to prevent people from entering. If the oxygen concentration is high, static charge from dust in air or from clothes, or a spark from illumination or other electric sources may cause fire or an explosion.  
A person who enters the gas-leak area should wear a respiratory protective device, such as a respirator.  
Measure and control the oxygen concentration in air.
- Environmental precautions : None
- Recovery and neutralization : Quickly ventilate and diffuse the leaked oxygen gas for dilution.

Prevention of second accident : Remove combustible materials such as wood materials, paper, and oil. Do not let air containing concentrated oxygen come in contact with organic matter and combustible substances.  
Remove all ignition sources.

---

## 7. Handling and Storage

### Handling

Technical measures : Use a pressure regulator, hose, and pressure gauge for oxygen. Do not use these devices for other gases. Use a pressure gauge with an indication "Lubrication prohibited."  
Keep equipment and ancillary equipment for oxygen (such as tank, cylinder, valves, evaporator, and gauges) clean, and protect them from oil and grease, organic matter, dust, rust, and burrs. If any of these substances adheres to equipment, remove it completely before using the equipment.  
Do not handle the parts in contact with oxygen gas with oily or dirty hands or gloves. In advance, confirm that no oil or grease has adhered to your hands, gloves, and clothes. If oil or grease catches fire in oxygen gas, it will explode.  
Do not use combustible gaskets for the supply system.  
Take measures to prevent the cylinder falling and do not handle it carelessly. If the cylinder falls and its valve gets damaged, high-pressure gas blows out, and the cylinder may be propelled like a rocket.  
Before using the cylinder, check the gas name, punch mark, painting color (black for oxygen), and indications. If the content is not what you need, do not use it and return the cylinder to the dealer.  
Use a predetermined handle to open and close the cylinder valve. Open and close the cylinder valve slowly. Otherwise, it may catch fire because of frictional heat, or the pressure regulator or pipe may catch fire because of adiabatic compression.  
When opening or closing the valve, do not hit it with a hammer. If you cannot open or close it by hand, indicate it and return the cylinder to the dealer.  
Do not use oxygen gas directly from the cylinder. Always use a pressure regulator.  
To attach the pressure regulator, select a screw suitable for the cylinder valve.  
After correctly attaching the pressure regulator, loosen its pressure-control handle by rotating anticlockwise before opening the cylinder valve, and then open the valve slowly. During this operation, stand to the side of the pressure regulator. Do not stand in front or behind the pressure regulator.  
Check joint parts, hose, pipes, and equipment to confirm that

there is no leakage. To conduct a leak test easily, safely, and reliably, use a bubbling liquid, such as soapy water. When leaving a work site, always close the cylinder valve. Then, release the gas inside the pressure regulator and loosen the pressure-control handle. Do not use the cylinder as a part of an electric circuit. Do not strike an arc during arc welding in order to prevent damage. If the cylinder valve is frozen, warm it with warm water (40 °C or cooler). Do not heat directly with a burner. Users should receive instructions on the correct use of these facilities and equipment from manufacturers or dealers and follow the operation manuals and instructions.

- Local ventilation and general ventilation : When oxygen gas is used, oxygen concentration may increase in air. Therefore, do not use the gas in a closed or poorly ventilated area.
- Precautions for safe handling : When the cylinder is not used, make sure to attach a detachable protection cap. The cylinder should be filled only by authorized personnel. Do not repair or repaint the cylinder, or remove or replace the cylinder valve or safety device, anywhere other than cylinder inspection stations. Do not change, erase, or peel the punch mark and indications. Do not use the cylinder as a roller or mold, or for purposes other than the intended purpose. To provide or receive the cylinder from dealer or manufacturer, assign a responsible person in advance. When the date of the cylinder defined in the agreement has expired or the cylinder is empty, return it immediately to the dealer. Do not use oxygen gas to replace compressed air or air. Handle the cylinder in accordance with the High Pressure Gas Safety Act. When releasing gas to remove dust or dirt adhered inside the outlet ring of the cylinder, face the outlet toward an empty area and open the gas outlet valve very slightly for a short time. High-pressure gas released directly toward the human body may cause injury. Do not put your hand into blowing high-pressure gas. After use, leave a pressure of 0.1 MPa or higher inside the cylinder, close the valve firmly, and reattach the cap. Return the cylinder to the empty gas cylinder storage site immediately. If the cylinder might contain a mixture of any gas other than oxygen, stop using it immediately, attach a “Do not use” plate, and store it separately from other cylinders. Inform the dealer of the cylinder details, including cylinder sign and number.

As oxygen gas has a much higher oxidizing power than air, it should not be allowed to come into contact with alkali metals, benzoic acid (powder), carbon disulfide, fiber materials, hydrogen + catalyst, acetone, acetylene, alcohol, oil, and grease.

If organic matter or combustible materials comes into contact with oxygen gas, they may react rapidly or explode at almost any temperature and pressure.

Fabric, wood, and other porous organic materials retain oxygen gas for a relatively long time. As they burn fiercely, do not place them close to an ignition source.

Even incombustible or flame-resistant substances that do not burn in air may burn in oxygen gas.

Together with water, oxygen accelerates metal corrosion.

#### Storage

Appropriate storage conditions : Separate from combustible and toxic gases. Store filled and empty gas cylinders separately at a site clearly indicated for oxygen gas cylinders.

Do not place combustible materials near the storage site.

Prepare fire control equipment next to the oxygen gas cylinder site.

Ventilate the storage site well, and measure and control the oxygen concentration so that it does not exceed 25 vol%.

The site must be kept away from, and protected from, fire or sparks.

Do not store the cylinders near electric wiring and earth wires.

Store the cylinders in a well-drained, dry, and well-ventilated place.

Protect them from corrosive atmosphere or continuous vibration.

Keep them away from direct sunlight and maintain the temperature below 40 °C.

Safe packaging materials : Use cylinders designed and manufactured as high-pressure cylinders for oxygen gas.

---

## 8. Exposure Controls/Personal Protection

Standard control concentration : N/A

Threshold limit values

• ACGIH TLV-TWA : N/A

• Value recommended by : N/A

Japanese Society of Occupational Health

• OSHA PEL TWA : N/A

Engineering controls

Ventilation and emission : Local or general ventilation device.

Safety management and gas detection : Gas detector and detecting tube.

Storage precautions	: When using or storing indoors, keep away from combustible materials and take measures for ventilation in order to keep oxygen concentration below 25%.
Protective equipment	
Respiratory protection	: Respirator or air-supplied respirator if needed.
Hand protection	: Leather gloves.
Eye protection	: Safety mask and protective glass.
Skin and body protection	: No special protection is required.

## 9. Physical and Chemical Properties

• Appearance, etc.	: Gas at ambient temperature and pressure
• Color	: Colorless
• Odor	: Odorless
• pH	: -
• Melting point	: -218.8 °C
• Boiling point	: -183 °C
• Flashing point	: None (incombustible)
• Explosive range	: None (incombustible)
• Vapor pressure	: No data
• Relative vapor density(Air=1)	: 1.11 (25 °C, 1 atm)
• Specific gravity or bulk	: 1.429 kg/ m <sup>3</sup> (0 °C, 0.1013 MPa (1 atm))
specific gravity	
• Solubility	: 3.1 mL/100 mL H <sub>2</sub> O (25 °C, 0.1013 MPa (1 atm))
• <i>n</i> -Octanol/water partition coefficient (Log Po/w)	: No data
• Auto-ignition temperature	: No data
• Flammability	: None

## 10. Stability and Reactivity

- ◇Stability
  - Stable under normal conditions
- ◇Reactivity
  - May react with strong oxidizing compounds.
- ◇Conditions to avoid
  - Reaction with organic matter and other combustible materials.
  - As oxygen concentration increases, combustion speed accelerates, ignition point decreases, flame temperature increases, and flame expands.
- ◇Incompatible materials
  - Alkali metals, benzoic acid (powder), carbon disulfide, fiber materials, hydrogen + catalyst, acetone, acetylene, alcohol, oil and grease, and other organic and combustible materials.
  - Other combustible materials
- ◇Hazardous decomposition products
  - None

## 11. Toxicological Information

Acute toxicity As oxygen concentration in air increases, the following health effects are observed:

Oxygen concentration (vol%)	Affect
18 to 25	Safety margin
36	Prolonged inhalation of oxygen at concentrations above this limit may cause poisoning symptoms.
46	Even short-time inhalation of oxygen at concentrations above this limit may cause poisoning symptoms such as epileptic convulsions, labiochoreic stuttering, vertigo, tiredness, respiratory irritation, muscle cramps, delirium tremens, auditory hallucinations, loss of visual acuity, and toe pain.

## 12. Ecological Information

Degradability/ Concentration

- No information

Bioaccumulation

- No information

Ecotoxicity

- No information

## 13. Disposal Considerations

When this certified reference material becomes unnecessary or the due date expires, return it to the Metrology Management Center.

- Return the empty gas cylinder directly to the owner.
- In the unlikely event of oxygen disposal, select a well-ventilated area where the surrounding areas have no fire or combustible materials and release the oxygen in small amounts.
- The cylinder must be disposed by the owner in accordance with the law. The user cannot dispose of the cylinder without the owner's permission.

## 14. Transport Information

UN Number : 1072

UN Classification : Class 2.2, Sub Risk 5.1

Shipping Name : OXYGEN, COMPRESSED

Packing Group : -

ICAO/IATA : UN1072

Marine Pollutant : Not applicable

Precautions : • Store in a cool and well-ventilated area



- Close the cylinder valve firmly, and attach the cap correctly.
- Transport this reference material carefully while keeping it away from direct sunlight and fire and preventing accidental release due to falling, overturning, etc.
- Do not transport with food and feed.
- Do not add heavy objects.

---

## 15. Regulatory Information

- ◇High Pressure Gas Safety Act  
Compressed gas (Act Article 2-1)
- ◇Ship Safety Act  
High-pressure gas (Dangerous Material Rule Articles 2 and 3: Dangerous Material Announcement Appendix 1)
- ◇Act on Port Regulations  
Hazardous material high-pressure gas (Regulations for the Enforcement of Act on Port Regulations, Clause 12)
- ◇Civil Aeronautics Act  
No transportation (Regulations for the Enforcement of Civil Aeronautics Act, Clause 194)
- ◇Road Act  
Restrictions on vehicle traffic (Road Act Enforcement Ordinance, Clause 19-13)
- ◇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.

---