

# 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 : November 30, 2017 Revised on : June 14, 2018 Reference No. : 3402003

Identity of : Certified reference material NMIJ CRM 3402-c

Substance/Mixture Sulfur Dioxide

Recommended Use of : This certified reference material (CRM) is for use in calibration 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 Gas under pressure : Liquefied gas

Acute toxicity (Inhalation, : Class 3

gas)

Severe eye damages/eye : Class 2A

irritant

Specific target organ : Class 1 (respiratory system)

toxicity/systemic toxicity

(Single exposure)

Specific target organ : Class 1 (respiratory system)

toxicity /systemic toxicity

(Repeated exposure)

GHS label element :



Signal word : Danger

Hazards Statement : Gas under pressure : May explode if heated

Toxic if inhaled (gas)

Causes serious eye irritation

Causes impairment of respiratory tract

Causes impairment of respiratory system through prolonged or repeated

exposure

Other Hazards : May cause eye damage or loss of vision if gas is blown out from container

Statement of gas under pressure and caught in eyes.

Precautionary : [Precaution]

NMIJ CRM 3402-c 1/9



#### Statement

- Do not handle until all safety precautions have been read and understood.
- Take precautions to prevent container from falling and being knocked over, and avoid rough handling.
- · Do not eat, drink or smoke when using this reference material.
- · Thoroughly ventilate handling area.
- Keep away from ignition sources such as heat, sparks, open flame and hot surfaces. No smoking.
- Use personal protective equipment and ventilation equipment and avoid exposure.
- Wash hands thoroughly after handling.
- [Action]
- In case of gas leakage, close container valve immediately.
- Leaking gas fire: Do not extinguish, unless leakage can be stopped safely.
- Eliminate all ignition sources if safe to do so.
- If exposed or concerned: Get medical advice/attention. [Storage]
- · Close container valve, put protection cap in place and store locked up.
- Protect from sunlight, and store away from fire at temperatures not exceeding 40 °C in a well-ventilated place.

[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 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 : Single Substance
Chemical name : Sulfur dioxide
Synonym : Sulphur dioxide

Reference Number in : Act on the Evaluation of Chemical Substances and Regulation of

Gazetted List in Japan Their Manufacture, etc. : (1)-536 : Industrial Safety and Health Act :published

Hazardous Component : Sulfur Dioxide

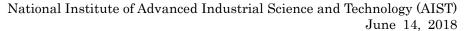
## 4. First-aid Measures

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 or if you feel unwell, get medical advice/ attention.

NMIJ CRM 3402-c 2/9



Rinse skin immediately.

• If you feel unwell, get medical advice/attention.

If inhaled · Remove victim to fresh air and keep at rest in a position

comfortable for breathing.

• If you feel unwell, get medical advice/attention.

· Rinse thoroughly mouth with water. If swallowed

• If you feel unwell, get medical advice/attention.

Expected Acute and Delayed Symptom

If inhaled: Coughing, Breathing difficulties, Sore throat,

May experience delayed symptoms.

If on skin: In contact with liquid: Cryogenic burn If in eyes: Flare, Pain, Severe thermal burn

Most Critical Characteristic and Symptoms of pulmonary edema are often developed in two to three hours after exposure and they will get worsened unless victim is kept

at rest. It is essential, therefore, to keep victim at rest and perform

medical follow-up.

Protection of First-Aid

Responder

Symptom

Wear personal protective equipment.

#### 5. Fire-fighting Measures

Extinguishing Media

· Use extinguishing media appropriate for surrounding fire.

Fire-Specific Hazards

· Container may explode if heated.

Burst container may fly.

· In case of fire, may emit irritating, corrosive or toxic gas.

Specific Fire-Fighting Method

· Move containers away from area of fire if this can be done without

· Keep cooling container thoroughly with plenty of water even after extinction.

 Fight fire from a maximum reasonable distance by using unmanned hose holder and nozzle equipped with monitor.

• Do not spray water directly to gas leaking point or safety device, which may make them frozen.

· Only experts are allowed to handle damaged container.

· For initial firefighting, use dry chemical extinguishing system. Wear gas mask, etc.

· Do not pour water into container.

Protection of Fire-Fighters Fight fire upwind in order to avoid breathing hazardous gas. Use personal protective equipment such as fireproof clothing,

heat-resistant clothing, protective clothing, compressed air open-circuit self-contained breathing apparatus, compressed oxygen closed-circuit self-contained breathing apparatus, rubber gloves and rubber boots.

#### 6. Accidental Release Measures

Personal Precaution · Do not touch or walk in leaked materials.

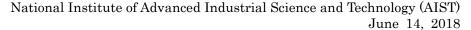
> · Immediately designate restricted leakage area with appropriate distance taken in every direction and keep out unauthorized people.

Maintain the restricted area until gas diffuses.

· Before entering a confined area, ventilate the area.

Personal Protective · Wear appropriate personal protective equipment (See "8. Exposure

NMIJ CRM 3402-c 3/9



Equipment and Emergency **Procedures** 

Controls/Personal Protection") during the operation to avoid contact with eyes and skin and inhalation of gas.

- · Wear tightly-sealed impervious protection clothing if fire is not induced by the leakage.
- · Stay upwind.
- · Keep away from low-level grounds.
- · Before entering a confined area, ventilate the area.

Environmental Precautions

• Take precautions to prevent leaked materials from draining into rivers etc. to adversely affect the environment.

· Avoid release to the environment.

Recovery and Neutralization

Ventilation

 Follow expert instructions for removal and disposal of leaked materials.

• If this reference material leaks from pressurized container, turn the leaking point upward, if possible, in order to prevent the gas from leaking in a liquid form.

Prevention of Secondary Disaster  Prevent leaked materials from entering sewers, drainage systems, basement rooms or confined space.

· Do not spray water directly to leaked materials or their sources.

### 7. Handling and Storage

Handling

Engineering **Precautions** 

Take the engineering precautions stipulated in "8. Exposure Controls/Personal Protection" and wear personal protective equipment.

Local and General Ventilation

Controls/Personal Protection."

Precautions for Safe

Handling

- · Observe the High Pressure Gas Safety Act when handling.
- · Do not contact with, inhale or swallow this reference material.

Provide local and general ventilation stipulated in "8. Exposure

- · Suffocation risk if inhaled in plenty.
- · Risk of death if inhaled.
- · Risk of materials corrosion in case of leakage.
- · Causes inflammation if in contact with skin, mucous membrane, etc.
- · Use only outdoors or in a well-ventilated area.
- · Wash hands thoroughly after handling.
- Do not eat, drink or smoke when using this reference material.
- Take precautions to prevent container from falling, being knocked over, etc.
- Keep removable protection cap and valve guard firmly in place when not in use.
- · Put valve guard and then protection cap after use.
- Install pressure regulator, if in use, in accordance with correct procedures. Loosen pressure adjustment handle of pressure regulator by turning it counterclockwise before opening container valve. Then open container valve slowly.
- · It is recommended, if possible, to pump down inside of pressurereducing valve before opening container valve in order to avoid contamination of this reference material.
- Stand at the side of pressure regulator, not in front of or at the back

NMIJ CRM 3402-c 4/9



of pressure regulator, when opening container valve. Close container valve tightly.

- Do not refill container. Do not change, erase or peel off engraved information, label, etc. of container.
- Check joints, hoses, pipes and equipment for leakages before use by using bubble solution such as soap.
- Provide exhaust ventilation to keep concentrations in air well below occupational exposure limits.
- 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.

Storage

Engineering

· Observe the High Pressure Gas Safety Act, etc.

Precautions

Appropriate Storage

Conditions

• Protect container from sunlight, and store away from fire at

temperatures not exceeding 40 °C.

- · Avoid exposure to corrosive ambience.
- Close container valve and put protection cap in place. Store locked up.

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 dioxide)

• ACGIH TLV-TWA : TLV-TWA 2 ppm A4

TLV-STEL 5 ppm A4

• Japan Society for

Occupational Health Recommended Reference

Value

Facility engineering control

Ventilation, exhaust : Use process sealing, local exhaust, and other equipment measures to

: Not established (under review)

keep air concentration below the Occupational exposure limit.

Safety management,

gas detection

Measuring equipment, Detecting

Storage precaution : Install eyewash and a safety shower in the workplace where this

material is stored or handled.

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.

NMIJ CRM 3402-c 5/9



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

Appearance, etc. : Compressed gas

Color : Colorless transparent

Odor : Irritating odor

pH : No data Melting point : -75.5 °C Boiling point : -10 °C

Flashing point : Nonflammable Explosive range : Nonflammable Vapor pressure : 330 kPa (20 °C)

Relative vapor : 2.25

density(Air=1)

Specific gravity or bulk : 1.4 (-10 °C, liquid)

specific gravity

Solubility : 85 mL/L (25 °C)

n-Octanol/water partition :  $\log Pow = -2.20$  (surmised value)

coefficient (Log Po/w)

Auto-ignition temperature : Nonflammable

Decomposition temperature : No data

Flammability : Nonflammable

Viscosity : 0.368 mPa · s (0 °C, liquid)

#### 10. Stability and Reactivity

Stability : If heated, a pressure increase will occur and container may burst or

explode.

Reactivity : Aqueous solution of this reference material is moderately strong acid,

reacting intensely with ammonia, acrolein, acetylene, alkali metals,

chlorine, ethylene oxide, amines and butadiene.

React with water and steam, triggering corrosion risk. Take precautions against contact with halogen.

Conditions to Avoid : Heat

In presence of water: Causes damage to many metals including

aluminum, iron, steel, brass, copper and nickel.

If in a liquid form: Causes damage to plastic, rubber and film-forming

agents.

Hazardous

decomposition

products

No data

### 11. Toxicological information

Acute Toxicity : Classified as Category 3, based on the following data:

Inhalation (gas): It was reported that, in the four-hour inhalation exposure study using rats, no dead rats were observed at the

NMIJ CRM 3402-c 6/9



concentration of 593 ppm, three out of eight rats were dead at 965 ppm, five out of eight rats were dead at 1168 ppm, and all of the eight rats were dead at 1319 ppm. Based on these results, the LC<sub>50</sub> value of this study is determined to be between 593 ppm and 1319 ppm.

Skin Corrosion/

Irritation

No data available

Serious Eye Damage/

Eye Irritation

Classified as Category 2A, based the following data:

It is concluded that severe eye irritation was caused as it was reported that, in the case of human exposure to this reference material of high concentration, reversible conjunctivitis and chemical burn on cornea

surface were observed.

No data available

Respiratory

Sensitization or Skin

Sensitization

Skin sensitization No data available No data available Germ Cell

Mutagenicity

Carcinogenicity Concluded as "No classification," based on the followings:

> Classified as Group 3 by IARC. Classified as A4 by ACGIH.

Not classifiable due to insufficient data

Reproductive Toxicity

Specific Target Organ

Toxicity/Systemic

(Single Exposure)

Toxicity

Classified as Classified as Category 1 (Respiratory tract), based on the

following data:

It was reported that, in the inhalation exposure study using guinea pigs, dogs, rabbits or rats, airway mucosa irritation, increase in airway resistance and loss of airway cilia were observed at concentrations within the range of guidance values for Category 1. Also in the human inhalation exposure study, it was reported that respiratory functional deterioration such as increase in airway resistance was observed. It was

also reported that, in the case of accidental exposure to high

concentration, pulmonary edema was observed.

Impairment of respiratory tract

Specific Target Organ

Toxicity/Systemic

**Toxicity** 

(Repeated Exposure)

Classified as Category 1 (Respiratory tract), based on the following data: It was reported that, in the inhalation exposure study using rats and guinea pigs, pneumonia and bronchitis were observed at concentrations

within the range of guidance values for Category 1.

Impairment of respiratory system due to prolonged or repeated

exposure

#### 12. Ecological Information

Hazardous to the

aquatic environment,

short-term (Acute)

Hazardous to the aquatic environment, long-term (Chronic)

Classification not possible due to lack of data

Classification not possible due to lack of data

NMIJ CRM 3402-c 7/9



#### 13. Disposal Considerations

Residual Waste : Return the unnecessary cylinder to the gas supplier.

Dispose of gas under pressure 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 when it becomes beyond its shelf life.

Container must be disposed of by its owner in accordance with relevant legislation. User of container, therefore, must not dispose of it by his/her

discretion.

#### 14. Transport Information

UN Number : 1079 UN Classification : Class 2.3

Material name : SULPHUR DIOXIDE

Container grade

ICAO/IATA

: Class 2.3, Sub-class: v8

Marine pollutant : Not applicable

Precautions : Follows the provisions of the ship safety law.

Transport this reference material carefully while keeping it away from direct

sunlight and fire and preventing accidental release due to falling,

overturning, etc.

#### 15. Regulatory Information

High Pressure : Liquefied gas (Article 2-3)

Gas Safety Act Toxic gas (general high pressure gas safety regulation Article 2-2)

Industrial Safety : Article 57-2 (Enforcement Order: Article 18-2) Hazardous substance whose

and Health Act name, etc. must be notified, No. 414.

Specific chemical substance prevention rule: Article 2-1-6, Specific chemical

substance, type 3.

Ship Safety Law : High Pressure Gas (Regulation Article 3 Notification of dangerous goods

Appendix No. 1)

Civil : High Pressure Gas (Regulation Article 194 Notification of dangerous goods

Aeronautical Act Appendix No. 1)

Air Pollution : Hazardous air pollutant (Article 17-1, enforcement order article 10)

Control Act

Labor Standards : Disease chemical substance (Article 75-2, Enforcement regulation article 35,

Act Appendix Table 1-2-4, Sulfur Dioxide)

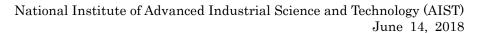
This SDS is originally prepared for the use of the material in Japan, thus the stated laws and regulations are stipulated and carried out in Japan. The use of the material in other countries should be referred to and by application of the relevant laws and regulations of the country in which the material will be used.

#### 16. Other Information

Others

The information in this document is not intended to be exhaustive and is based on currently

NMIJ CRM 3402-c 8/9





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.

NMIJ CRM 3402-c 9/9