

Safety Data Sheet



1. Identification of the Substance/Mixture and the Supplier

Supplier : National Institute of Advanced Industrial Science and Technology (AIST)

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Identity of Substance/Mixture : Certified Reference Material NMIJ CRM 3003-b
Arsenic(III) Trioxide

Recommended Use of the Chemical and Restriction on Use : Intended use for this CRM is the calibration of instruments, or confirming the validity of analytical methods or instruments during analysis of polychlorinated biphenyls (PCBs) in mineral oil samples and similar materials. Do not use this reference material for other purposes than testing/research.

2. Hazards Identification

GHS classification:

Acute toxicity (Oral)	: Class 2
Severe eye damages/eye irritation	: Class 2A
Germ-cell mutagenicity	: Category 2
Carcinogenicity	: Class 1A
Reproductive toxicity	: Class 1A
Particular target organ/systemic toxicity (Single exposure)	: Class 1 (Digestive organ) Class 1 (Heart) Class 1 (Skeletal muscles) Class 1 (Respiratory organ)
Particular target organ/systemic toxicity (Repeated exposure)	: Class 1 (Central nervous system) Class 1 (Peripheral nervous system) Class 1 (Immune system) Class 1 (Respiratory organ) Class 1 (Liver) Class 1 (Kidney) Class 1 (Skin) Class 1 (Blood vessel)

	Water environment toxicity : Class 3 (Acute)
	Water environment toxicity : Class 3 (Chronic)
GHS label element:	
Signal word :	Danger
Hazard and toxicity:	<p>Lethal if swallowed</p> <p>Severe eye irritation</p> <p>May cause heritable genetic damage</p> <p>May cause cancer</p> <p>May cause adverse effects on reproductive function and fetus</p> <p>Damages to organs (digestive organ, cardiac system, skeletal muscles, respiratory organ)</p> <p>Damages to organs due to long-term or repeated exposure (central nervous system, peripheral nervous system, immune system, respiratory organ, liver, kidney, skin, vascular system)</p> <p>Harmful to aquatic organisms</p> <p>Long-term impact harmful to aquatic organisms</p>
Precautionary statement :	<p>[Preventive measures]</p> <p>Read and understand the safety precautions fully before handling</p> <p>Obtain the instruction manual before handling</p> <p>Use protective eyeglasses, protective mask. Use individual protective equipment as necessary</p> <p>No eating, drinking or smoking when handling</p> <p>Wash hands well after the handling</p> <p>Avoid inhaling the dust and fume</p> <p>Avoid discharging to the environment</p> <p>[Response]</p> <p>If swallowed : Drink a large amount of lukewarm water and induce vomiting. Seek medical advice immediately.</p> <p>If in eyes : Rinse carefully with plenty of water for several minutes. If contact lenses are inserted, take them out if possible and continue rinsing.</p> <p>If inhaled : Move to a fresh air. Blow the nose and gargle. Keep warm and rest, seek medical advice immediately</p> <p>If on skin : Take off all the contaminated clothing, shoes, etc. Rinse off the contaminated spots with soapsuds and wash away with a large amount of water.</p> <p>If eye irritation persists, seek medical advice</p> <p>If feeling ill, seek medical advice,</p> <p>If exposed or possibility of exposure: Seek medical advice.</p> <p>[Storage]</p>

Store in a locked area.

[Disposal]

Disposing of this material and its container should be outsourced to a professional industrial waste disposal contractor licensed by the prefectural governor.

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

3. Composition/Information on Ingredients

Substance or mixture	: Single product
Chemical name	: Arsenic(III) Trioxide
Other name	: Diarsenic trioxide, Arsenious acid, Arsenic(III) oxide, Arsenious acid anhydride
Mass fraction(%)	: 100 %
Chemical or structural formula	: As_2O_3
Molecular weight	: 197.84
Reference Number in Gazetted List in Japan	: Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (1) - 35 Industrial Safety and Health Act : Published
CAS No.	: 1327-53-3
Hazardous component	: Arsenic(III) Trioxide

4. First-aid Measures

If in eyes	: Rinse with plenty of clean water for several minutes. If contact lenses are inserted, take them out if possible and continue rinsing.
If on skin	: Take off the contaminated clothing, shoes etc. immediately. Rinse off the contaminated spots with soapsuds and wash away with a large amount of water.
If inhaled	: Move to a fresh air. Blow the nose and gargle. Keep warm and rest. Seek medical advice.
If swallowed	: Drink a large amount of lukewarm water and induce vomiting. Seek medical advice immediately. In case of gastric lavage, use ferric hydroxide freshly-precipitated by adding ammonia solution to ferric chloride.
Anticipated acute and delayed symptoms	: Skin dryness, reddening and pain, dermal burn, blister, conjunctival inflammation,, burning sensation, coughing, shortness of breath, asthma, headache, sore throat, dizziness, feeling of weakness, nausea, vomit, abdominal pain, stomach convulsion, diarrhea, muscle convulsion, shock. Delayed symptoms : Damages to organs (liver, kidney), cardiovascular system, nervous system, hematopoietic system, death
Most important characteristics and symptoms	: -

Measures to be taken to protect the person : A rescuer should use suitable protective equipment applying emergency first-aid

5. Fire-fighting Measures

- Extinguishing media : The material is nonflammable at normal condition.
Use extinguishing agent suitable for the materials on the periphery.
- Specific hazards at the time of fire : May form irritant or toxic fume at the time of fire. Use suitable protective equipment to avoid inhaling the smoke.
- Specific extinguishing measures : Remove any source of ignition from a seat of the fire and extinguish using appropriate extinguishing agent. Transfer the movable container to a safe place promptly. If impossible to transfer, use water spray to cool the container and the periphery.
- Protecting fire-fighting personnel : Extinguishing activities on windward side, avoid inhaling toxic gases. Use protective equipment such as air-breathing apparatus, etc.

6. Accidental Release Measures

- Personal precautions, protective equipment and emergency procedure : If released indoor, ventilate well until the treatment is completed.
Use suitable protective equipment to protect the skin from the airborne droplets and avoid inhaling dust and gas.
Rope-off the leaked area and restrict access to the area to the authorized personnel only.
Evacuate the people on the leeward and work on the windward side.
- Environmental precaution : To prevent causing environmental impact, do not release the spilled material into rivers, etc. directly. Treat the contaminated waste water appropriately before discharging to the environment.
- Recovery, neutralization : Collect scattered material as much as possible in an empty container and then spray ferric sulfate solution and treat with aqueous solution of calcium hydroxide or soda ash, etc., and lastly wash away with a large amount of water.
- Measures to prevent secondary accident : Rope-off the leaked area and restrict access to the area to the authorized personnel only.
Evacuate the people on the leeward and work on the windward side.
Prevent the material from draining into a ditch, sewer, basement or closed area.

7. Handling and Storage

Handling

- Technological counter measures : Avoid heating, contact with acid or reducing media
Use suitable protective equipment
- Local ventilation/general ventilation : Use local exhaust ventilation system when handling indoor.
- Precautions for safe handling : Do not treat the container roughly, no dropping, knocking down or dragging.
Prevent leakage, spillage or overflow that causes the dust or fume to form.
Wash hands and face, etc. well and gargle after the handling
Eating, drinking or smoking only at the designated areas.
Use suitable protective equipment to avoid inhaling, contact with eyes, skin and the clothing.
Entering the handling area by the authorized persons only.

Storage

- Appropriate condition : Store in a tightly closed container, in a well ventilated areas
Keep away from fire sources, acids, reducing media.
Store in a locked safety cabinet
- Material for safe packing : Polyethylene

※ Please refer to the certificate regarding details of appropriate storage conditions and precautions for use as reference material.

8. Exposure Controls/Personal Protection

Administrative levels

- Workplace assessment standards : 3 $\mu\text{g}/\text{m}^3$ (as As)

Occupational exposure limit

- ACGIH TLV-TWA : 0.01 mg(As)/ m^3
- Japan Society for Occupational Health Recommended Reference Value : 3 $\mu\text{g}/\text{m}^3$ (Excess lifetime cancer risk level 10^{-3})
0.3 $\mu\text{g}/\text{m}^3$ (Excess lifetime cancer risk level 10^{-4})
- OSHA PEL TWA : 0.01 mg(As)/ m^3

Facility engineering

- Ventilation, exhaust : Use local exhaust ventilation system when handling indoor.
Install safety shower, hand/eye washer, and indicate their location conspicuously.

Protective equipment

- Respiratory organ : Dust respirator (At the time of fire: Self-contained breathing apparatus)
- Hands : Protective gloves
- Eyes : Protective eyeglasses
- Skin and body : Protective boots, protective clothing
- Sanitary measures : No eating, drinking or smoking when handling the material
Wash hands well after using.

Do not take the work clothing home

9. Physical and Chemical Properties

• Appearance, etc.	: Powder
• Color	: White
• Odor	: Odorless
• pH	: No data
• Melting point	: 275 °C to 313 °C (Sublimation point 193 °C)
• Boiling point	: 465 °C
• Flashing point	: No data
• Explosive range	: No data
• Vapor pressure	: No data
• Relative vapor density (Air=1)	: No data
• Specific gravity or bulk specific gravity	: 3.7 g/cm ³ to 4.2 g/cm ³
• Solubility	: Insoluble in water (1.8 g/100 ml water, 20 °C), soluble in hydrochloric acid, sulfuric acid, caustic potash, aqueous ammonia
• <i>n</i> -Octanol/water partition coefficient (Log Po/w)	: No data
• Auto-ignition temperature	: No data

10. Stability and Reactivity

◇ Stability

- Stable under normal condition

Sublimates. When heated, generates poisonous gas, arsenic trioxide (III) having extremely toxic effect.

◇ Reactivity

- Aqueous solution is mildly acidic that reacts with reducing agent and may form extremely toxic gas (Arsine)

◇ Condition to avoid

- Sunlight, heat, open flame, high temperature, other ignition sources. Contact with incompatible hazardous substances.

◇ Hazardous decomposition products

- Generates arsenic trioxide (III) when heated

11. Toxicological Information

Acute toxicity	Oral rats LD ₅₀ = 20 mg/kg, 188 mg/kg, 385 mg/kg (EHC 224(2001)) (LD ₅₀ = 25 mg/kg, calculated from the above three numbers based on the GHS guideline)
Skin corrosivity/irritation	No data available
Severe damage to eyes/eye irritation	Eye irritation tests performed on rabbits observed 'edema of eyelids, corneal damage and corneal opacity' (CERI Hazard Data)

Germ cell mutagenicity	<p>2001-8(2001))</p> <p>CERI Hazard Data 2001-8(2002), Japan Society for Occupational Health</p> <p>Recommended Value (2002) and DFGOTvol.21(2005) describe negative results of heritable germ cell mutagenicity tests (dominant –lethal test) and of in vivo germ cell mutagenicity tests (chromosomal aberration test) and positive results of in vivo somatic cell mutagenicity tests (chromosomal aberration tests). but there is no description of in vivo germ cell genotoxicity test. However, the positive results obtained from chromosomal abnormality tests used for the classification are the evidence from epidemiological study, thus this reference material is not identified as the exposed substance, so caution is advised.</p>
Carcinogenicity	<p>As arsenic compound</p> <p>NTP : K (May be carcinogenic to humans)</p> <p>IARC : Group 1(Carcinogenic to humans)</p> <p>ACGIH : A1(Known carcinogen)</p> <p>Japan Society for Occupational Health : Group 1(Substance carcinogenic to humans)</p>
Reproductive toxicity	<p>From the multiple epidemiological studies described in CERI Hazard Data 2001-8(2002) and EHC 224(2001)), the correlation between the exposures to arsenic and the adverse effects on reproductive capability were observed (increase in the mortality rate of fetus, newborn infant and born child; decrease in the weight at the birth, increase in natural miscarriage, stillbirth and congenital abnormality). In addition, the teratogenicity tests on Syrian hamsters observed deformities including cranioschisis and defective kidney at dose levels not toxic to mother animals. The teratogenicity tests on mice do not mention the toxicity to mothers, but observed decrease in a number of embryos, and skeletal deformity. However, the information related to the confounding variable factors concerning the results of the epidemiological studies is not sufficient, so caution is advised.(NITE)</p>
Particular target organ/ systemic toxicity (Single exposure)	<p>As for humans, ‘nausea, severe digestive tract symptoms involving diarrhea, muscle spasm and cardiac abnormality’, ‘irritation of mucous membrane of the nasal cavity (may develop nasal septum deficiency), irritation of pharynx and bronchial tubes,’ etc. observed (IARC 23(2004)) . As for experimental animals, ‘dry vomiting, bleeding in the intestinal tract’ etc.(EHC 224(2001), Thus the particular target organs are digestive tube, heart, skeletal muscle, respiratory organ (NITE)</p>
Particular target organ/ systemic toxicity (Repeated exposure)	<p>As for humans, ‘lymphocytes depletion’, ‘enlargement of the liver, anorexia, upper respiratory symptoms, cutaneous affection, peripheral nerve disorder’, ‘obvious damages to liver and kidney’(IARC 23 (2004)), ‘gangrene due to peripheral</p>

vascular disorder, in Taiwan, the total amount of exposure after being exposed for several years was calculated as approximately 20 g/year of Arsenic and that had caused black foot disease', 'Arsenic(III) Trioxide caused irritation of the body surface, skin, conjunctive, nasal mucous membrane, and nasal cavity perforation' etc. described in CERI Hazard Data 2001-8(2002). As for experimental animals, possible particular target organs are the central nervous system, peripheral nervous system, immune system, respiratory organ, liver, kidney skin and blood vessel based on the description, 'hair loss, eczema, squamous epithelium hyperplastic of epidermis, increased keratosis, cutaneous ulcer and crust formation' 'metaplastic change of alveolar epithelium, tract epithelium' etc. (CERI Hazard Data 2001-8(2002)). Also, the effects on the experimental animals observed within the Class 1 exposure guidance value.

12. Ecological Information

Ecotoxicity

- Toxic to aquatic life with long lasting effects
- Fish (Rainbow trout) 96H LC50=20.2 mg/L

Persistence and Degradability

- Metallic compound

Bioaccumulative Potential

- Bioaccumulative Potential is low. (Note: BFC=5)
- Hazard category in acute hazard class is 3, and the bioaccumulative potential is low. But behavior of the metallic compound in the water is unknown.

Mobility in soil

- No data available

Hazard to the Ozone Layer

- No data available

13. Disposal Considerations

- Residual Waste : 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 containers after thoroughly removing their contents.

14. Transport Information

- UN number : 1561
- UN classification : Class 6.1(Poisonous substance)
- Material name : Arsenic(III) Trioxide

Container grade	: PG II
ICAO/IATA	: Class 6.1 Grade II
Marine pollutant	: Not applicable
Precautions	: Make sure that there is no leak from the container. Avoid dropping, falling damaging when loading and prevent from collapsing load or unfasten the load.

15. Regulatory Information

- ◇ Fire Service Act
 - Not applicable
 - ◇ Poisonous and Deleterious Substances Control Act
 - Poisonous substance Packaging Grade 1
 - ◇ Industrial Safety and Health Act
 - Article 57 (Enforcement Order: Article 18) Hazardous substance whose name, etc. must be labeled
 - Article 57, 2 of the Law ((Article 18, 2 of the Enforcement Order) Toxic substances of which the names etc. are the subject of notification No.458.
 - Ordinance on Prevention of Hazards Due to Specified Chemical Substances
Specified Chemical Substance Group 2
 - ◇ Ship Safety Act
 - Poisonous substance
 - ◇ Civil Aeronautic Act
 - Poisonous substance
 - ◇ Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management (PRTR Law)
 - Specific Class I Designated Chemical Substance No.332
 - ◇ Water Pollution Control Law
 - Article 2 Paragraph 2 (Hazardous substances)
 - ◇ Soil Contamination Countermeasure Law
 - Specific Hazardous Substance
- ◎ 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.