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 (NMIJ)
Person in Charge	:	Person in Charge of Certified Reference Materials
Telephone No.	:	+81-29-861-4059 Fax No. : +81-29-861-4009
Emergency Contact	:	Same as above
		Prepared on : July 13, 2009
		Revised on : August 31, 2022
		Reference No. : 4055001
Identity of Substance/Mixture	:	Certified Reference Material NMIJ CRM 4055-a Styrene
Recommended Use of the Chemical and Restriction on Use	:	This reference material can be used, for calibration and validation of analysis equipment in VOC analysis. 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:	Flammable liquid	:	Class 3
	Skin corrosivity/irritant		Class 2
	Severe eye damage/eye irritant	:	Class 2A
	Acute toxicity (Oral)	:	Class 5
	Acute toxicity (Inhalation)	:	Class 4
	Germ-cell mutagenicity	:	Category 2
	Carcinogenicity		Class 2
	Reproductive toxicity	:	Class 1B
	Particular target organ/systemic toxicity (Single exposure)	:	Class 1 (Central nervous system) Class 3 (Respiratory tract irritant)
	Particular target organ/systemic toxicity (Repeated exposure)	:	Class 1 (Respiratory organ) Class 1 (Nervous system) Class 1 (Blood system) Class 1 (Liver)
	Aspiration hazard	:	Class 1
	Water environment toxicity(Acute)	:	Class 2

GHS label element:

Signal word : Danger

Hazard and toxicity :
Flammable liquid and vapor
Skin irritation
Severe eye irritation
May be harmful if swallowed
Harmful by inhalation
May cause heritable genetic damage
May cause cancer
May have adverse effects on reproductive function and embryo
Damages to organs (Central nervous system)
May irritate respiratory organ
Damages to organs due to long-term or repeated exposure (Respiratory organ、nervous system、blood system、liver)
May be fatal by swallowing or entering respiratory tract
Toxic to aquatic organisms

Precautionary statement :
［Preventive measures］
Read and understand the safety precautions fully before handling
Obtain an instruction manual before handling
No eating, drinking or smoking when handling
Keep away from ignition sources such as heat, sparks, open flame, high temperature matter. Smoking prohibited.
Use explosive-proof electrical appliances, ventilation system, lighting equipment.
Prevent from catching fire due to electrostatic discharge or sparks
Use individual protective equipment and ventilation system to avoid exposure
Use protective gloves, protective eyeglasses and protective mask.
Handle the material in outdoor area or in well ventilated area
Do not inhale mist, vapor or spray.
Wash hands well after handling
Avoid discharging to the environment.
［First-Aid Measure］
Take appropriate extinguishing measures at the time of fire.
If inhaled : Move to a fresh air, take a comfortable posture to ease breathing and rest. Do not induce vomiting.
If in eyes :Rinse carefully with water for several minutes. If contact lenses are inserted, take them out if possible and continue to rinse.
If on skin :Rinse with soap suds and a large amount of water
If eye irritation persists, seek medical advice.

If feeling unwell, seek medical advice
In case of skin irritation, seek medical advice
［Storage］
Seal the container and lock it up in a safety cabinet. The storage should be cool and well ventilated.
［Disposal］
This material or its container should be outsourced to a professional industrial waste disposal contractor licensed by the prefectural governor.

Hazardous and toxic properties not specified in the above are neither the object
of the classification nor classifiable

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3. Composition/Information on Ingredients

Single or compound product	:	Single product
Chemical name	:	Styrene
Other name	:	Phenylethylene, styrole
Content	:	99 % and over
Chemical or structural formula	:	$C_6H_5CHCH_2$
Molecular weight	:	104.15
Reference Number in Gazetted List in Japan	:	Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (3)-4 Industrial Safety and Health Act : Published
CAS No.	:	100-42-5
Hazardous component	:	Styrene

4. First-aid Measures

If inhaled	:	Move to a fresh air, take a comfortable posture to ease breathing and rest. Seek medical advice immediately.
If on skin	:	Rinse with a large amount of water and soap suds promptly Seek medical advice Wash the contaminated clothing before reusing.
If in eyes	:	Rinse carefully with water for several minutes. If contact lenses are inserted, take them out if possible, and continue to rinse. If the irritation persists, seek medical advice .
If swallowed	:	Rinse the mouth and seek medical advice immediately. Do not try to induce vomiting.
Anticipated acute	:	Symptoms such as reddening of the eyes, skin flare, dizziness,

and delayed symptoms,	:	headache, nausea, feeling of weakness, depressed consciousness, asthma, lung edema
The most important characteristics and symptoms		In many cases, asthma and lung edema develop after a while and the symptoms will worsen if the affected is not kept at rest.
Measures to be taken to protect the person applying first aid	:	Keep away from fire sources Use respiratory protective equipment

5. Fire-fighting Measures

Extinguishing media	:	Powder, carbon dioxide, foam (alcohol resistance foam), water
Specific hazards at the time of fire	:	The container may explode when heated May form irritating or toxic fume (or gas) at the time of fire, so use suitable protective equipment to avoid inhaling smoke when involving in extinguishing activity,
Specific extinguishing measures	:	Remove combustible sources from the seat of 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 periphery.
Protecting fire-fighting personnel	:	Extinguishing activities on windward side, avoid inhaling toxic gases Use protective equipment such as self-contained compressed air breathing apparatus, etc.

6. Accidental Release Measures

Personal precautions	:	Promptly remove any ignition sources from around the material.
Protective equipment and emergency procedure		Ready for a fire by keeping an appropriate extinguisher at hand If released indoor, ventilate well until the treatment is completed. Use suitable protective equipment to protect the skin from airborne droplets and avoid inhaling mist and gas. Rope-off the leaked area and restrict access only to the authorized persons. 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	:	Prohibit fire sources, ventilate well. Adsorb the spilled liquid to waste cloth or to sand and soil and wipe off completely. Collect everything used to clean up the spillage in an airtight container, dispose of all the contaminated items later.
Measures to prevent secondary accident	:	Remove all ignition sources from around promptly Rope-off the leaked area and restrict access only to the

authorized persons.
Evacuate the people on the leeward and work on the windward side.

7. Handling and Storage

Handling

Technological counter measures	:	Keep away from fire sources. Keep away from high temperature matter sparks, and strong oxidizers
Local ventilation/ general ventilation	:	Use local exhaust ventilation system when handling indoor
Precautions for safe handling	:	Use explosion proof structured equipment and instruments, and take countermeasure against static electricity. Work clothing and work shoes should be of conductive material Handle the container carefully. Do not handle it roughly. No dropping, falling or dragging Prevent from forming dust and vapor by leaking, spilling or scattering Wash hands and face, etc. well and gargle after handling Eating, drinking and smoking only in the designated area. Use suitable protective equipment to avoid inhaling or in contact with eyes, skin and the clothing. Entering the handling area only by the authorized persons.

Storage

Appropriate condition	:	Use explosion proof structured electrical equipment in the storage area, and ground all the equipment. Store in an airtight container by avoiding direct sunlight, The storage place should be cool and well ventilated. Keep away from fire sources and strong oxidizers. Store in a locked safety cabinet.
Safe packing material	:	Glass

※The precautions pertaining to an appropriate storage condition and handling as a reference material can be referred to the authentication certificate.

8. Exposure Controls/Personal Protection

Administrative level

Working environment assessment standard: 20 ppm

Occupational exposure level

・ACGIH TLV-TWA	:	20 ppm,85 mg/m^3
・Japan Society for Occupational Health	:	20 ppm 85 mg/m^3(Dermal absorption)

Recommended Reference Value
・OSHA PEL TWA : 100 ppm

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

Protective equipment
Respiratory organ : Chemical cartridge respirator for organic gas, respiratory protective equipment
Hands : Protective gloves
Eyes : Protective eyeglasses
Skin and body : Protective boots, clothing
Sanitary measures : No eating, drinking or smoking when handling this material. Wash hands well after handling

9. Physical and Chemical Properties

・Appearance, etc.	:	Oily liquid
・Color	:	Clear or yellow
・Odor	:	Peculiar odor
・pH	:	No data
・Melting point	:	−30.7 °C
・Boiling point	:	145 °C
・Flashing point	:	31 °C
・Explosive range	:	1.1 vol % to 6.1 vol % (In air)
・Vapor pressure	:	670 Pa (20 °C)
・Relative vapor density(Air=1)	:	3.6
・Specific gravity or bulk specific gravity	:	0.906 (20 °C)
・Solubility	:	Water-insoluble (0.03 g/100 mL Water 25 °C), miscible in ethanol and ether
・*n*-Octanol/water partition coefficient (Log Po/w)	:	3.2
・Auto-ignition temperature	:	490 °C

10. Stability and Reactivity

Stability
・Stable under normal condition

Reactivity
・Polymerizes when heated under the influence of light that involves the risk of fire or explosion.

Condition to avoid
・Sunlight, heat, open flame, high temperature, sparks, static electricity, other ignition sources.

Hazardous decomposition products
・Carbon monoxide

11. Toxicological Information

Acute toxicity	:	Oral rat LD50:2650 mg/kg Inhalation rat LC50:12 mg/m^3/4H Abdominal cavity rat LD50:898 mg/kg Oral mouse LD50:316 mg/kg Inhalation mouse LC50:9500 mg/m^3/4H Abdominal cavity mouse LD50:660 mg/kg Intravenous mouse LD50:90 mg/kg (RTECS)
Skin corrosivity/irritation	:	Skin irritation rabbit 500 mg mild
Severe damage to eyes/ eye irritation	:	Eye irritation rabbit 100 mg severe (RTECS) Eye irritation rabbit 100 mg/24H moderate (RTECS)
Germ cell mutagenicity	:	No data available
Carcinogenicity IARC		Category 2B (Presumed carcinogen to humans)
Japan Society for Occupational Health	:	Category 2B (Suspected carcinogen to humans (limited evidence))
Reproductive toxicity		A three-generation reproductive toxicity of this material performed in rat at the dose level having no adverse effect on FO, observed decrease in viability of new born offspring of the F1 and F2. The reproductive and developmental toxicity study as well as the perinatal and postnatal study of this material in rat by oral administration at a dose having no adverse effects on mother animal observed many behavior abnormalities in the offspring such as decrease in cerebral serotonin, delayed righting reflex and auditory reflex, etc. (CERI・NITE Hazard Assessment ReportNo.52 (2004))
Particular target organ/ systemic toxicity (Single exposure)	:	Suggests effect on central nervous system, irritating effect on nose (EHC 26(1983), CERI Hazard Data 96-46 (1998)).
Particular target organ/ systemic toxicity (Repeated exposure)	:	As for humans, irritation of eyes, skin, nose and throat, adverse effects on respiratory organs such as obstructive pulmonary disease and chronic bronchitis, adverse effects on central nervous system such as dizziness, headache, fatigue, confusion, insomnia, etc., mental and neurological dysfunction such as reduced reaction time and verbal memory hypomnesia, effects on visual and auditory senses, effects on blood system such as lymphocytic proliferation and decrease in platelet count, effects on liver such as elevated activity of AST・GGT・ALT (CERI・NITE Hazard Assessment Report No.52(2004)).
Aspiration hazard	:	The material being hydrocarbon, its kinematic viscosity 0.772

mm²/s
(25°C) (CERI Calculated value) which may be fatal if swallowed and
enters respiratory tract (Class 1)

12. Ecological Information

Degradability, concentration

・No data available

Bioaccumulation

・No data available

Ecotoxicity

・Fish Fathead minnow　LC50:4.02 mg/L/96hr

13. Disposal Considerations

・Spray the material with a flammable solvent into an incinerator equipped with scrubber.

14. Transport Information

UN No.	:	2055
UN classification	:	Class 3(Flammable liquid)
Material name	:	Styrene
Container grade	:	PG Ⅲ
ICAO/IATA	:	Class 3　Grade Ⅲ
Marine pollutant	:	Not applicable
Precautions	:	Check the container and ensure that it does not leak. Prevent the container from collapsing, dropping or falling to cause leakage or spillage etc.

15. Regulatory Information

Fire Service Act

・Hazardous material Category 4 No 2 Petroleum (water insoluble) Hazard class 3

Poisonous and Deleterious Substances Control Act

・Not applicable

Industrial Safety and Health Act

・Article 57-2 (Enforcement Order: Article 18)　Hazardous substance whose name, etc. must be labeled.

・Article 57-2 (Enforcement Order: Article 18-2)　Hazardous substance whose name, etc. must be notified No. No.323

・Enforcement Order Appended Table No 1, 4 Hazardous material, Flammable material

・Ordinance on Prevention of Hazards Due to Organic Solvent Poisoning
Second-class organic solvent, etc.

・Working Environment Measurement Standards, Working Environment Evaluation Standard

Ship Safety Act

・Flammable liquid

Civil Aeronautic Act

・Flammable liquid

Law Relating to the Prevention of Marine Pollution and Maritime Disaster

・Enforcement Order Appended Table No. 1, Toxic liquid substance, Category Y equivalent substance

Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Law)

・Class 1 Designated chemical substance No.177 (No.240 Class 1 Designated chemical substance under the new PRTR Law, Date of enforcement 01, 10, 2009)

Offensive Odor Control Act

・Enforcement Order Article 1 (Specified offensive odor substance)

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.