

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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 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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ID Number : 4217001

Identity of Substance/Mixture : Certified reference material: NMIJ CRM 4217-a Sulfur in Toluene-high concentration
 Recommended Use of the Chemical and Restriction on Use : This certified reference material (CRM) is intended for use in controlling the precision of analysis or confirming the validity of instruments during the determination of (5 to 10) mg/kg sulfur in liquid samples. Do not use this reference material for other purposes than testing/research.

2. Hazards Identification

GHS Classification : Flammable liquid : Hazard Category 2
 Acute Toxicity (Oral) : Hazard Category 5
 Acute Toxicity (Inhalation, vapor) : Hazard Category 4
 Serious Eye Damage/ Eye Irritation : Hazard Category 2
 Serious eye damage/ Eye irritation : Hazard Category 2B
 Reproductive toxicity : Hazard Category 1A
 Specific Target Organ Toxicity/Systemic Toxicity (Single Exposure) : Hazard Category 1 (central nervous system)
 : Hazard Category 3 (respiratory tract irritation, anesthetic action)
 Specific Target Organ Toxicity/Systemic Toxicity (Repeated Exposure) : Hazard Category 1 (central nervous system, kidney, liver)
 Respiratory system toxicity (if inhaled) : Hazard Category 1
 Water environment : Hazard Category 2

toxicity (Acute)

GHS label element :



Signal Word : Danger

Hazards Statement : Highly flammable liquid and vapor
 Skin irritation
 Eye irritation
 May be harmful if swallowed
 Harmful by inhalation
 May have adverse effects on sexual function and fertility or embryo/
 fetus
 Organ dysfunction (Central nervous system)
 May lead to irritation of respiratory system
 May lead to drowsiness or dizziness
 May cause damage to organ by prolonged or repeated exposure
 (Central nervous system, kidney and liver)
 May be fetal if swallowed or if aspirated into respiratory tract
 Aquatic toxicity

Other Hazards : May cause serious poisoning through vapor inhalation

Precautionary : [Precaution]

Statement Use eye protector/face protector/gloves.
 Prevent release of this reference material to the environment.
 Obtain the certificate of this reference material prior to use, and do
 not handle it before reading and understanding all safety
 precautions.
 Use this reference material only in an outdoor or well-ventilated
 environment.
 Wash hands thoroughly after handling this reference material.
 Keep this reference material away from heat/spark/open flame/
 high-temperature items. No smoking.
 Avoid mist/vapor inhalation.
 In case of fire, use appropriate fire-extinguishing means.
 Take off contaminated clothing and wash it when it is reused.
 [Action]
 Eye contact: Irrigate eyes carefully with water for a few minutes.
 Then take out contact lenses if it is possible to easily do so. Keep
 irrigating eyes after taking out contact lenses. Seek medical
 examination/treatment if eye irritation is prolonged.
 Seek medical attention when feeling sick.
 Ingestion: Seek medical attention when feeling sick. Flush mouth. Do
 not make the person vomit.
 Inhalation: Move the person to fresh air and keep him/her at rest in
 an easy-to-breathe position.
 Skin contact: Take off all contaminated clothing immediately. Flush

exposed skin area with running water. Seek medical examination/treatment if skin irritation develops.

When being exposed or when there are concerns about exposure: Seek medical examination/treatment.

[Storage]

Store in a locked area.

Store this reference material in a light-shielded clean environment at about 5 °C.

[Disposal]

Incinerate this reference material and its containers in an appropriate incinerator. Or entrust disposal of this reference material and its containers to a professional waste disposal company licensed by prefectural government.

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

3. Composition/Information on Ingredients

Substance or mixture : Mixture
Chemical name : Sulfur in Toluene

Ingredient 1

Chemical name : Toluene
Synonym :
Chemical formula : C₆H₅CH₃
Molecular weight : 92.14
CAS number : 108-88-3
Content : 99 % or above
Reference Number in : Act on the Evaluation of Chemical Substances and Regulation of
Gazetted List in Japan Their Manufacture, etc. : (3)-2
Industrial Safety and Health Act : Published

Ingredient 2

Chemical name : Thiophene
Synonym : -
Chemical formula : C₄H₄S
Molecular weight : 84.14
CAS number : 110-02-1
Content : 0.0007%
Reference Number in : Act on the Evaluation of Chemical Substances and Regulation of
Gazetted List in Japan Their Manufacture, etc. : (9)-810
Industrial Safety and Health Act : Published

Hazardous substance : Thiophene, Toluene (Toluene is deleterious substance)

4. First-aid Measures

- If in Eyes : Rinse cautiously with clean water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical advice/attention immediately.
- If on Skin : Rinse away thoroughly with clean water. Take off/Remove contaminated clothing, shoes, etc. Get medical advice/attention.
- If Inhaled : Remove victim to fresh air and keep at rest and warm. Get medical advice/attention.
- If Ingested : Rinse mouth thoroughly with water. Do not induce vomiting, if it is not the instructions from a doctor. Get medical advice/attention when feeling unwell.
- Predicted immediate and delayed symptoms : Dizziness, headache, nausea, hangover, an extreme case there be death.
- Most important symptom/effect : -
- Protecting Personnel in emergency measures : Wear protective equipment such as rubber gloves, eye protective goggles.

5. Fire-fighting Measures

- Extinguishing Media : Powder, foam, carbon dioxide, dry sand, water spray (rod-like water injection prohibited).
- Fire-Specific Hazards : In the case of fire, irritating or toxic fume (or gas) may be generated.
- Specific Fire-Fighting Method : Eliminate ignition sources at the origin of a fire and put out fire by using extinguishing media. Remove movable containers promptly to a safe place. In the case of immovable containers, cool their surroundings with sprayed water.
- Protection of Fire-Fighters : Carry out fire-fighting from the windward in order to avoid breathing hazardous gas. Use personal protective equipment such as fire protection clothing, heat-resistant clothing, protective clothing, breathing apparatus, circulating oxygen respirator, rubber gloves, and rubber boots.

6. Accidental Release Measures

- Personal Precaution : This CRM is flammable Prepare fire-fighting equipment for the possibility of fires.
- Personal Protective Equipment and Emergency Procedures : Ventilate the affected areas thoroughly, if it is in an indoor environment, until the clean-up operation is completed. Use appropriate personal protective equipment during the operation to avoid skin contact of splash etc. and inhalation of dust and gas.
- Environmental Precautions : Take precautions to prevent spillage from draining into rivers etc. to adversely impact the environment. Make it sure to appropriately treat contaminated wastewater in order to prevent untreated wastewater from being released into the surrounding

- environment.
- Recovery and Neutralization : Adsorb the spilled liquid to liquid absorbent (sand, diatom earth, acid-binding agent, universal binding agent, sawdust) etc. and collect the contaminated items in an empty container.
- Prevention of Secondary Disaster : Mark the restricted area with rope etc. to keep out unauthorized people. Carry out the clean-up operation from the windward and make people on the leeward side evacuate.

7. Handling and Storage

Handling

- Engineering : Strict ban on fire.
- Precautions : Keep away from hot surfaces and sparks.
- Local and General Ventilation : Use local ventilation system in indoor handling areas.
- Precautions for Safe Handling : Avoid rough handling such as turning over, dropping, giving a shock to or dragging containers.
 Prevent spill, overflow and scattering, and avoid vapor generation.
 Keep container tightly closed after using this reference material.
 Wash hands, face etc. thoroughly and gargle after handling this reference material.
 Do not eat, drink, or smoke during handling
 Restrict drinking, eating and smoking to a designated area.
 Use appropriate personal protective equipment to avoid inhalation and contact with eyes, skin and clothing.
 Do not bring gloves and other contaminated personal protective equipment into staff room.
 Make a place handling this reference material a restricted area to keep out unauthorized people.

Storage

- Appropriate Storage Conditions : Keep out of light and stored in a clean place at normal room temperature.
 Store in a locked area.
 Electrical equipment to be used in the storage location should be explosion-proof structure, and grounded, if necessary.
 Do not store in the vicinity of strong oxidizing substances and the fire sources.
- Safe Container Packaging Material : Glass

8. Exposure Controls/Personal Protection

Threshold Limit Value (toluene)

50 ppm

Permissible Concentration (toluene)

- ACGIH TLV-TWA : 50 ppm, 188 mg/m³; skin notation

- Values recommended : 50 ppm, 188 mg/m³; percutaneous absorption
by Japan Society for Occupational Health
 - OSHA PEL TWA : 200 ppm;CL 300;Pk 500/10M
- Permissible Concentration (thiophene)
Not specified
- Facility engineering
- Ventilation, exhaust :
 - Keep container tightly closed and install local ventilation system when dust is generated.
 - Install facilities to rinse eyes and to wash hands and body in the vicinity of a place handling this reference material and label them.
 - Safety management/ gas detector : Measuring instrument, detector tube
 - Storing precaution : Ventilate along floor surface.
- Personal Protective equipment
- Respiratory protection : Protective gas mask for organic vapors, Self-contained compressed air breathing apparatus,
- Hands : Protective gloves
- Eyes : Eye protector (Goggle type as necessary)
- Skin and Body : Protective clothing, protective boots
- Hygiene measure : Treat in accordance with rules on Industrial hygiene and Industrial safety. Note: Toluene will corrode rubber or the like

9. Physical and Chemical Properties

- Appearance, etc. : Liquid
- Color : Colorless
- Odor : Characteristic odor
- pH : No data
- Melting point : -95 °C
- Boiling point : 110.6 °C
- Flashing point : 4 °C
- Explosive range : 1.2 vol % to 7.1 vol % (in Air)
- Vapor pressure : 49 hPa (30 °C)
- Relative vapor density(Air=1) : 3.1
- Specific gravity or bulk specific gravity : 0.867 (20 °C)
- Solubility : Insoluble in water (0.05g / 100 ml water, 25 ° C), miscible in ethanol and ether.
- *n*-Octanol/water partition coefficient (Log Po/w) : 2.69 (toluene)
- Auto-ignition temperature : No data

10. Stability and Reactivity

◇Stability

- Stable in normal conditions

◇Reactivity

- It may react with strong oxidizing materials.

◇Conditions to Avoid

- Sunlight, Heat, open flame, high temperature material, spark, static electrical charge, and other fire sources.

◇Hazardous Decomposition Products

- Carbon monoxide (CO)

11. Toxicological Information

Acute Toxicity	<p>Oral Rat LD50: 636 mg/kg (RTECS) Inhalation Rat LC50: 49 mg m⁻³/4 h (RTECS) Dermal Rabbit LD50: 14100 µL/kg (RTECS) Oral: Oral administration to rat: LD50=2600, 5500, 5580, 5900, 6400, 7000 and 7530 mg/kg (EU-RAR No.30 (2003)) Inhalation: Classified, by applying a formula, based on LC50 (4 hours) of inhalation exposure to rat: 12.5, 28.1, 28.8, 33 mg/L (EU-RAR No.30 (2003)). When using conversion factor (25 °C) of 1 mg/m³ = 0.265 ppm, LC50 (calculated value) = 18 mg/L is calculated to be 4,800 ppm. Saturated vapor pressure concentration (25 °C) is 33000 ppm when saturated vapor pressure (25 °C) is 3.3 kPa. LC50 of 4800 ppm, therefore, is found lower than 90% of the saturated vapor pressure concentration. Consequently it is considered to be “vapor with little mist.” (NITE)</p>
Skin Corrosion/ Irritation	<p>Skin irritation – Rabbit 20 mg/24 hours Moderate</p>
Serious Eye Damage/ Eye Irritation	<p>Eye irritation – Rabbit 2 mg/24 hours Serious EU-RAR No.30 (2003) describes, based on the results of the eye irritation test performed in accordance with “OECD Test Guideline,” that rabbits recover from eye irritation in seven days. It is considered, therefore, that toluene features light eye irritation. (NITE)</p>
Germ Cell Mutagenicity	<p>Chromosome aberration test: Inhalation – Rat 5400 µg m⁻³/16 weeks – Intermittent administration</p>
Reproductive Toxicity	<p>Human epidemiology study implies increase of spontaneous abortion due to exposure to toluene, dysgenesis/deformity of neonates due to toluene abuse by pregnant women and decrease of luteinizing hormone and testosterone concentration in blood plasma due to exposure to toluene (IRIS Toxicological review (2005), EU-RAR No.30 (2003), IARC 71 (1999), IARC 47 (1989), EHC 52 (1986) and ATSDR (2000)).</p>
Specific Target Organ Toxicity/Systemic Toxicity (Single Exposure)	<p>Toluene, which is quickly absorbed by humans mainly through inhalation, acts on central nervous system. Toluene inhalation of 50 ppm - 100 ppm causes fatigue, drowsiness, dizziness and light irritation to respiratory system. Toluene inhalation of 200 ppm-400 ppm causes excitation, accompanied by dysesthesia and nausea. Toluene inhalation of 500 ppm-800 ppm causes central nervous depression, intoxication, obfuscation and toppling gait, etc. (“CERI Hazard Data Collection” 96-4 (1997)). It is also reported that toluene causes irritation to eyes, nose and throat (EU-RAR No.30 (2003)) and that it has narcotic effects on</p>

<p>Specific Target Organ Toxicity/Systemic Toxicity (Repeated Exposure)</p>	<p>laboratory animals (EU-RAR No.30 (2003)) etc. Toluene causes drug dependence. It is reported that addicted inhalation causes headache accompanied by visual field constriction or nystagmus and hearing impairment, tremor, ataxia and chronic central nervous disorder such as impairment of memory. Cerebral atrophy is observed in CT test. Renal dysfunctions such as hematuria and proteinuria are also reported ("CERI Hazard Data Collection" 96-4 (1997)). SGOT increase, hepatotoxicity accompanied by fatty degeneration of hepatocyte and lymphocyte infiltration, etc. is reported as well (EU-RAR No.30 (2003)).</p>
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12. Ecological Information

Persistence and Degradability

- Persistence: 112~120% by BOD

Bioaccumulative Potential

- No data available

Ecotoxicity

- Crustacea (brine shrimp) EC50=3.5 mg/L/96 h (EU-RAR, 2003)

13. Disposal Considerations

- Dispose in accordance with applicable regional, national and local laws and regulations.
- Dispose of containers after thoroughly removing their contents.

14. Transport Information

UN Number	: 1294
UN Classification	: Class 3 (flammable liquid)
Shipping Name	: Toluene
Packing Group	: PG II
ICAO/IATA	: Class 3- II PAT305(5L) Y305(1L) CAO307(60L)
Marine Pollutant	: Hazardous Liquid Substance (Class C)
Precautions	: Transport this reference material carefully while keeping it away from direct sunlight and preventing accidental release due to falling, overturning, etc.

15. Regulatory Information

Fire Service Act

- Hazardous Materials 4 Class 1 petroleum (insoluble in water) Danger Rating 2

Industrial Safety and Health Act

- Article 57 (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. 407

Poisonous and Deleterious Substances Control Act

- Deleterious substance (toluene) Container grade class III

Civil Aeronautics Act

- Ordinance for Enforcement of the Civil Aeronautics Act, Article 194 , Dangerous Goods, Flammable Liquid (Class G-2)

Pollutant Release and Transfer Register (PRTR) Law

- Class 1 Designated Chemical 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

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.
