

SAFETY DATA SHEET

1. Identification of the substance or mixture and of the supplier

GHS Product identifier: Tetrahydrofuran

Other means of identification

Product No.: 2858, 8498, 9432, 9439, 9440, 9441, 9446, 9447, 9450, 9923, V530, V558

Recommended use of the chemical and restrictions on use

Recommended use: For Laboratory, Research or Manufacturing Use.

Recommended restrictions: Not determined.

Details of the supplier of the safety data sheet

Company Name: Avantor Performance Materials, LLC
 Address: 100 Matsonford Rd, Suite 200
 Radnor, PA 19087
 Telephone: Customer Service: 855-282-6867
 Fax:
 Contact Person: Product Information Compliance
 E-mail: info@avantormaterials.com

Emergency telephone number: CHEMTREC: 001-800-13-203-9987 (24/7)

2. Hazard(s) identification

GHS classification of substance or mixture, and national or regional information:

Physical Hazards

Flammable liquids Category 2

Health Hazards

Acute toxicity (Oral) Category 4
 Acute toxicity (Dermal) Category 5
 Skin Corrosion/Irritation Category 2
 Serious Eye Damage/Eye Irritation Category 2A
 Carcinogenicity Category 2
 Specific Target Organ Toxicity - Single Exposure Category 3

Unknown toxicity

Acute hazards to the aquatic environment 0 %
 Chronic hazards to the aquatic environment 100 %

GHS label elements

Hazard symbol(s):



Signal Word: Danger

Hazard Statement(s): Highly flammable liquid and vapor.
Harmful if swallowed.
Causes skin irritation.
Suspected of causing cancer.
May cause respiratory irritation.
May cause drowsiness or dizziness.

Precautionary statement(s):

Prevention: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Take action to prevent static discharges. Wear protective gloves/protective clothing/eye protection/face protection. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Avoid breathing dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area.

Response: IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower]. If skin irritation occurs: Get medical advice/attention. IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. Call a POISON CENTER/doctor if you feel unwell. Take off contaminated clothing. In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction.

Storage: Store in a well-ventilated place. Keep cool. Store locked up. Keep container tightly closed.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

| Chemical Identity | Common name and synonyms | CAS number | Concentration* |
|-------------------|--------------------------|------------|----------------|
| Tetrahydrofuran | No data available. | 109-99-9 | 100% |

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Description of necessary first-aid measures

- Ingestion:** Call a physician or poison control center immediately. Do not induce vomiting without advice from poison control center. Never give liquid to an unconscious person.
- Inhalation:** Move to fresh air. Get medical attention if symptoms persist. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration.
- Skin Contact:** Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.
- Eye contact:** Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Most important symptoms/effects, acute and delayed

- Symptoms:** Irritating to eyes, respiratory system and skin.
- Hazards:** Suspected of causing cancer.

Indication of immediate medical attention and special treatment needed

- Treatment:** Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

- General Fire Hazards:** Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back.

Suitable (and unsuitable) extinguishing media

- Suitable extinguishing media:** Water spray, foam, dry powder or carbon dioxide.
- Unsuitable extinguishing media:** Avoid water in straight hose stream; will scatter and spread fire.

- Specific hazards arising from the chemical:** Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapors or gases to explosive concentrations. May form explosive peroxides.

Special protective action for fire fighters

- Special fire fighting procedures:** Use water spray to keep fire-exposed containers cool. Water may be ineffective in fighting the fire. Fight fire from a protected location. Move containers from fire area if you can do so without risk. Cool containers exposed to flames with water until well after the fire is out. Vapors may travel considerable distance to a source of ignition and flash back. Vapors may cause a flash fire or ignite explosively.
- Special protective equipment for fire-fighters:** Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

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| Personal precautions, protective equipment and emergency procedures: | Use personal protective equipment. Keep unauthorized personnel away. Keep upwind. Ventilate closed spaces before entering them. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). See Section 8 of the SDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. |
| Environmental Precautions: | Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground. |
| Methods and material for containment and cleaning up: | In case of leakage, eliminate all ignition sources. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal. |
| Notification Procedures: | Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved. |

7. Handling and storage

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| Precautions to ensure safe handling: | DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Contact with air and light may form explosive peroxides. If peroxide formation is suspected, do not open or move container. Use personal protective equipment as required. Avoid breathing mists or vapors. Do not taste or swallow. Use only with adequate ventilation. Avoid contact with eyes, skin, and clothing. Wash hands thoroughly after handling. See Section 8 of the SDS for Personal Protective Equipment. |
| Conditions for safe storage, including any incompatibilities: | Keep away from food, drink and animal feeding stuffs. Prolonged contact with air may cause formation of explosive peroxides. Nitrogen blanketing of containers is recommended. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids. |

8. Exposure controls/personal protection

Control Parameters

Occupational Exposure Limits

| Chemical Identity | Type | Exposure Limit Values | Source |
|-------------------|------|-----------------------|---|
| Tetrahydrofuran | TWA | 200 ppm | Thailand. OELs (DLPW Notification Re: Occupational Exposure Limits for Hazardous Chemicals) (08 2017) |
| Tetrahydrofuran | TWA | 50 ppm | US. ACGIH Threshold Limit Values (2011) |
| | STEL | 100 ppm | US. ACGIH Threshold Limit Values (2011) |

Biological Limit Values

| Chemical Identity | Exposure Limit Values | Source |
|-------------------|-----------------------|--------|
|-------------------|-----------------------|--------|

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| Tetrahydrofuran (tetrahydrofuran: Sampling time: End of shift.) | 2 mg/l (Urine) | ACGIH BEI (03 2013) |
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Appropriate Engineering Controls: No data available.

Individual protection measures, such as personal protective equipment

- General information:** Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof ventilation equipment.
- Eye/face protection:** Wear safety glasses with side shields (or goggles) and a face shield.
- Skin Protection**
- Hand Protection:** Chemical resistant gloves
- Other:** Wear suitable protective clothing.
- Respiratory Protection:** In case of inadequate ventilation use suitable respirator. Chemical respirator with organic vapor cartridge and full facepiece.
- Hygiene measures:** Provide eyewash station and safety shower. Observe good industrial hygiene practices. Do not eat, drink or smoke when using the product. Wash hands before breaks and immediately after handling the product. Wash contaminated clothing before reuse. Avoid contact with eyes, skin, and clothing.

9. Physical and chemical properties

Appearance

- Physical state:** Liquid
- Form:** Liquid
- Color:** Colorless
- Odor:** Ether-like
- Odor threshold:** No data available.
- pH:** No data available.
- Melting point/freezing point:** -108.3 °C
- Initial boiling point and boiling range:** 65 °C
- Flash Point:** -14 °C (Closed Cup)
- Evaporation rate:** 8 (butyl acetate=1)
- Flammability (solid, gas):** Class IB Flammable Liquid
- Upper/lower limit on flammability or explosive limits**
- Flammability limit - upper (%):** 11.8 %(V)
- Flammability limit - lower (%):** 1.8 %(V)
- Explosive limit - upper (%):** No data available.
- Explosive limit - lower (%):** No data available.
- Vapor pressure:** 21.60 kPa (25 °C)
- Vapor density:** 2.56 (Air=1)
- Relative density:** 0.88 (25 °C)

Solubility(ies)

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|---|--------------------|
| Solubility in water: | Miscible |
| Solubility (other): | No data available. |
| Partition coefficient (n-octanol/water): | 0.46 |
| Auto-ignition temperature: | 321 °C |
| Decomposition temperature: | No data available. |
| Viscosity: | No data available. |

Other information

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| Minimum ignition energy: | 0.54 mJ |
| Molecular weight: | 72.11 g/mol (C ₄ H ₈ O) |

10. Stability and reactivity

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| Reactivity: | No dangerous reaction known under conditions of normal use. |
| Chemical Stability: | Material is stable under normal conditions. |
| Possibility of hazardous reactions: | Hazardous polymerization does not occur. |
| Conditions to avoid: | Heat, sparks, flames. Protect against direct sunlight. |
| Incompatible Materials: | Strong oxidizing agents. Strong oxidizing agents. Acids. Bases, alkalies (organic). Air. May attack some plastics, rubber and coatings. |
| Hazardous Decomposition Products: | Thermal decomposition may release oxides of carbon. |

11. Toxicological information

Information on likely routes of exposure

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| Ingestion: | Harmful if swallowed. May cause irritation of the gastrointestinal tract. |
| Inhalation: | May cause respiratory irritation. |
| Skin Contact: | Causes skin irritation. |
| Eye contact: | Causes serious eye irritation. |

Symptoms related to the physical, chemical and toxicological characteristics

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|----------------------|--------------------|
| Ingestion: | No data available. |
| Inhalation: | No data available. |
| Skin Contact: | No data available. |
| Eye contact: | No data available. |

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

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| Oral Product: | LD 50 (Rat: 1,650 mg/kg) |
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Dermal

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| Product: | LD 50 (Rat: > 2,000 mg/kg) |
| Inhalation Product: | LC 50 (Rat, 1 h): 80975 ppm LC 50 (Rat, 4 h): 18000 - 22000 ppm NOAEL (Rat, 6 h): 15.9 - 16.8 mg/l |
| Repeated dose toxicity Product: | None known. |
| Skin Corrosion/Irritation Product: | Causes skin irritation. |
| Serious Eye Damage/Eye Irritation Product: | Causes serious eye irritation. |
| Respiratory or Skin Sensitization Product: | Not a skin nor a respiratory sensitizer. |
| Carcinogenicity Product: | Suspected of causing cancer. |
| IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: | No carcinogenic components identified |
| ACGIH Carcinogen List: | No carcinogenic components identified |
| Germ Cell Mutagenicity | |
| In vitro Product: | No mutagenic components identified |
| In vivo Product: | No mutagenic components identified |
| Reproductive toxicity Product: | No components toxic to reproduction |
| Specific Target Organ Toxicity - Single Exposure Product: | Narcotic effect. Respiratory tract irritation. |
| Specific Target Organ Toxicity - Repeated Exposure Product: | None known. |
| Aspiration Hazard Product: | Not classified |
| Other effects: | None known. |

12. Ecological information

Ecotoxicity

Acute hazards to the aquatic environment

Fish Product: No data available.

Specified substance(s):

Tetrahydrofuran LC 50 (Fathead minnow (Pimephales promelas), 96 h): 1,970 - 2,360 mg/l
EC 50 (Fathead minnow (Pimephales promelas), 96 h): 1,930 mg/l

Aquatic Invertebrates

Product: No data available.

Specified substance(s):

Tetrahydrofuran LC 50 (Water flea (Daphnia magna), 24 h): > 10,000 mg/l
EC 50 (Daphnia magna, 24 h): 5,930 mg/l

Chronic hazards to the aquatic environment

Fish

Product: No data available.

Aquatic Invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and Degradability

Biodegradation

Product: The product is moderately biodegradable.

BOD/COD Ratio

Product: No data available.

Bioaccumulative potential

Bioconcentration Factor (BCF)

Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)

Product: Log Kow: 0.46

Mobility

Mobility in soil: The product is water soluble and may spread in water systems.

Other adverse effects:

The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal considerations

Disposal methods

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

IATA

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|-------------------------------|------------------------|
| UN Number: | UN 2056 |
| Proper Shipping Name: | Tetrahydrofuran |
| Transport Hazard Class(es): | |
| Class: | 3 |
| Label(s): | 3 |
| Packing Group: | II |
| Environmental Hazards | |
| Marine pollutant: | Not a Marine Pollutant |
| Special precautions for user: | – |

IMDG

| | |
|-------------------------------|------------------------|
| UN Number: | UN 2056 |
| UN Proper Shipping Name: | TETRAHYDROFURAN |
| Transport Hazard Class(es) | |
| Class: | 3 |
| Label(s): | 3 |
| EmS No.: | F-E, S-D |
| Packing Group: | II |
| Environmental Hazards | |
| Marine Pollutant: | Not a Marine Pollutant |
| Special precautions for user: | – |

15. Regulatory information

Safety, health and environmental regulations specific for the product in question

Thailand. Hazardous Substances Prohibited from On-line Notification System (Notification of Ministry of Industry, B.E. 2547)
Not Regulated

Thailand. Notification of Ministry of Industry, Re: List of Hazardous Substances B.E. 2538

Thailand. Hazardous Substances under Chapter 3, Duties and Civil Liabilities (Notification of Ministry of Industry Re: Hazardous Substances under Chapter 3 of Hazardous Substances Act)
Not Regulated

Thailand. Notification of the Ministry of Interior, Re: Work Safety Relating to Dangerous Chemicals

Thailand. Notification of the Ministry of Interior, Re: Work Safety Relating to More Dangerous Chemicals

Thailand. Reportable Hazardous Substances (Notification of Ministry of Industry Re: Bases respecting report of quantity of hazardous materials under Department of Industrial Works, B.E. 2547)
Not Regulated

International regulations

Montreal protocol
Not applicable

Stockholm convention
Not applicable

Rotterdam convention
Not applicable

Kyoto protocol
Not applicable

Inventory Status:

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| Australia AICS: | On or in compliance with the inventory |
| Canada DSL Inventory List: | On or in compliance with the inventory |
| China Inv. Existing Chemical Substances: | On or in compliance with the inventory |
| Japan (ENCS) List: | On or in compliance with the inventory |
| Japan ISHL Listing: | On or in compliance with the inventory |
| Korea Existing Chemicals Inv. (KECI): | On or in compliance with the inventory |
| Mexico INSQ: | On or in compliance with the inventory |
| New Zealand Inventory of Chemicals: | On or in compliance with the inventory |
| Philippines PICCS: | On or in compliance with the inventory |
| Taiwan Chemical Substance Inventory: | On or in compliance with the inventory |
| US TSCA Inventory: | On or in compliance with the inventory |
| EINECS, ELINCS or NLP: | On or in compliance with the inventory |

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| 16. Other information, including date of preparation or last revision |
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Issue Date: 01.03.2021

Revision Date: No data available.

Version #: 1.2

Source of information: Sources of information used in preparing this SDS included one or more of the following: results from in house or supplier toxicology studies, information from the Toxicology Data Network (TOXNET), European Chemical Agency (ECHA) substance dossiers, IARC Monographs, US National Toxicology Program data, the Agency for Toxic Substances and Disease Registry, other manufacturer's SDSs and other sources, as appropriate.

Further Information: No data available.

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