

SAFETY DATA SHEET

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

Product identifier: Tetrahydrofuran

Other means of identification

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

Recommended use and restriction on use

Recommended use: For Laboratory, Research or Manufacturing Use.

Restrictions on use: 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	021-58783226
Fax:	
Contact Person:	Product Information Compliance
E-mail:	info@avantormaterials.com

Emergency telephone number: CHEMTREC: 4001-204937

2. Hazard(s) identification

Emergency Overview
Appearance
Color: Colorless

Form:	Liquid
Physical state:	Liquid
Odor:	Ether-like
Signal Word:	DANGER!
Potential Health Effects:	Highly flammable liquid and vapor. Harmful if swallowed. May be harmful in contact with skin. Causes skin irritation. Causes serious eye irritation. Suspected of causing cancer. May cause respiratory irritation. May cause drowsiness or dizziness.
Potential Physical / Chemical Effects:	Extremely flammable liquid and vapor - vapor may cause flash fire.

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 3¹

Target Organs

1. Respiratory tract irritation.

Hazard symbol(s):



Signal Word: Danger

Hazard statements: Highly flammable liquid and vapor.
 Harmful if swallowed.
 May be harmful in contact with skin.
 Causes skin irritation.
 Causes serious eye irritation.
 Suspected of causing cancer.
 May cause respiratory irritation.
 May cause drowsiness or dizziness.

Precautionary statement(s):

Prevention:	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. 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. Avoid breathing dust/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.
Response:	In case of fire: Use water spray, foam, dry powder or carbon dioxide for extinction. IF exposed or concerned: Get medical advice/attention. IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell. 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. Take off contaminated clothing. 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: Get medical advice/attention. Collect spillage.
Storage:	Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.
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
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Substances

Chemical Identity	CAS number	Content in percent (%)*
Tetrahydrofuran	109-99-9	99 - 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

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.
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.
Personal Protection for First-aid Responders:	No data available.

Most important symptoms/effects, acute and delayed

Symptoms:	Irritating to eyes, respiratory system and skin.
Hazards:	Suspected of causing cancer.
Notes to physician 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.
Means of fire extinguishing	
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 equipment and precautions for firefighters

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

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

Precautions for 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	PC-TWA	300 mg/m ³	China. OELs (Occupational Exposure Limits for Hazardous Agents in the Workplace) (GBZ 2.1) (03 2008)

Biological Limit Values

Chemical Identity	Exposure Limit Values	Source
Tetrahydrofuran (tetrahydrofuran: Sampling time: End of shift.)	2 mg/l (Urine)	ACGIH BEI (03 2013)

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)
Density:	0.88 g/ml (25 °C)
Relative density:	0.88 (25 °C)
Solubility(ies)	
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

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

10. Stability and reactivity

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.
Other information:	No data available.

11. Toxicological information

Information on likely routes of exposure

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

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

- Oral**
- Product:** LD 50 (Rat): 1,650 mg/kg
- Dermal**
- Product:** LD 50 (Rat): > 2,000 mg/kg
- Inhalation**
- Product:** LC 50 (Rat): 80975 ppm
LC 50 (Rat): 18000 - 22000 ppm
NOAEL (Rat): 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.

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.

Target Organs

Specific Target Organ Toxicity - Single Exposure: Respiratory tract irritation.

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 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

China

UN Number:	UN 2056
UN Proper Shipping Name:	TETRAHYDROFURAN
Transport Hazard Class(es)	
Class:	3
Label(s):	3
Packing Group:	II
Environmental Hazards:	No
Special precautions for user:	Not regulated.

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:	No

Special precautions for user: Not determined.

IATA

UN Number:	UN 2056
Proper Shipping Name:	Tetrahydrofuran
Transport Hazard Class(es):	
Class:	3
Label(s):	3
Packing Group:	II
Environmental Hazards:	No
Special precautions for user:	Not determined.

15. Regulatory information

China. National Catalogue of Hazardous Wastes

Tetrahydrofuran Listed.

China. Highly Toxic Chemicals (Dept. of Health Notice)

Not Regulated

China. Very Toxic Chemicals (Public Notice No. 2)

Not Regulated

China. Precursor Chemicals (Decree No. 445 of the PRC on Regulation for Administration of Precursor Chemicals, Appendix: Categories 1-3)

Not Regulated

China: CWC. Controlled Chemicals List (Regulations on the Administration of Controlled Chemicals, Decree No. 190, Dec. 27, 1995, as amended)

Not Regulated

China. Explosive Precursor Hazardous Chemicals (Ministry of Public Safety, 2011 version)

Not Regulated

China. National List of Ozone Depleting Substances (MEP/NDRC/MIIT Joint Notice No. 2010-72)

Not Regulated

China. Catalog of Hazardous Chemicals

Tetrahydrofuran Listed.

International regulations

Montreal Protocol

Not applicable

Stockholm convention

Not applicable

Rotterdam Convention

Not applicable

Kyoto Protocol

Not applicable

Inventory Status:

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

16. Other Information

Issue Date:	03-01-2021
Revision Date:	No data available.
Version #:	1.2
Further Information:	No data available.

References: 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.

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