SAFETY DATA SHEET

1 PRODUCT AND COMPANY IDENTIFICATION

GHS Product identifier: Tetrahydrofuran

Other means of identification

Product No.: 2858, 8498, 9432, 9439, 9440, 9441, 9446, 9447, 9450, 9923, V530, V558
Intended Use: For Laboratory, Research or Manufacturing Use.

Details of the supplier of the safety data sheet:
Avantor Performance Materials, LLC
100 Matsonford Rd, Suite 200
Radnor, PA 19087

Telephone:
Customer Service: 855-282-6867

Contact Person: Product Information Compliance
E-mail: info@avantormaterials.com

Emergency telephone: CHEMTREC: 00801-14-8954 (24/7)

2 HAZARDS IDENTIFICATION

GHS classification:

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[1.]

1. Respiratory tract irritation.

GHS label elements

Symbol(s):

Signal Words: Danger

Hazard Statement(s):
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 Statements

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.

3 COMPOSITION / INFORMATION ON INGREDIENTS

Substance or Preparation:

Chemical name	CAS-No.	Concentration
Tetrahydrofuran	109-99-9	>60%

4 FIRST AID MEASURES

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

Inhalation: Move to fresh air. Get medical attention if symptoms persist. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

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.

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.

Likely Acute or Delayed Symptoms/Effects Irritating to eyes, respiratory system and skin.

Notes to the physician: Treat symptomatically. Symptoms may be delayed.

5 FIRE-FIGHTING MEASURES

Extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: Avoid water in straight hose stream; will scatter and spread fire.

Unusual Fire & Explosion Hazards: 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 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.

Protective Measures: 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: 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.

Spill Cleanup Methods: 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

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.

Storage: 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

Appropriate Engineering Controls: 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.

Exposure Limits:

Chemical name	Type	Exposure Limit Values		Source
Tetrahydrofuran	TWA	200 ppm	590 mg/m3	Taiwan. OELs (Standards of Permissible Exposure Limits at Workplace, Notice No. 58463) (12 2003)
	STEL	250 ppm	737.5 mg/m3	Taiwan. OELs (Standards of Permissible Exposure Limits at Workplace, Notice No. 58463) (06 2014)

Personal protective equipment (ppe):

Respiratory Protection: In case of inadequate ventilation use suitable respirator. Chemical respirator with organic vapor cartridge and full facepiece.

Eye Protection: Wear safety glasses with side shields (or goggles) and a face shield.

Hand Protection: Chemical resistant gloves

Skin Protection: Wear suitable protective clothing.

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.
Freezing point:	-108.3 °C
Boiling Point:	65 °C
Flash Point:	-14 °C (Closed Cup)
Evaporation Rate:	8 (butyl acetate=1)
Flammability (solid, gas):	Class IB Flammable Liquid
Flammability Limit - Upper (%)–:	11.8 %(V)

Flammability Limit - Lower (%)–:	1.8 %(V)
Vapor pressure:	21.60 kPa (25 °C)
Vapor density (air=1):	2.56 (Air=1)
Relative density:	0.88 (25 °C)
Solubility(ies)	
Solubility in Water:	Miscible
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	0.46
Autoignition Temperature:	321 °C
Decomposition Temperature:	No data available.
Viscosity:	No data available.
Explosive properties:	No data available.
Oxidizing properties:	No data available.

Other information

Molecular weight:	72.11 g/mol (C4H8O)
Minimum ignition energy:	0.54 mJ

10 STABILITY AND REACTIVITY

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

Inhalation:	No data available.
Ingestion:	Harmful if swallowed. May cause irritation of the gastrointestinal tract.
Skin Contact:	Causes skin irritation.
Eye contact:	Causes serious eye irritation.

Information on toxicological effects

Acute toxicity

Oral

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

Dermal

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.

Germ Cell Mutagenicity

In vitro
Product: No data available.

Specified substance(s)
Tetrahydrofuran No data available.

In vivo
Product: No data available.

Specified substance(s)
Tetrahydrofuran No data available.

Carcinogenicity
Product: Suspected of causing cancer.

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: No data available.

Specified substance(s)
Tetrahydrofuran No data available.

Other adverse effects: None known.

12 ECOLOGICAL INFORMATION

General information: Not applicable

Ecotoxicity

Acute toxicity

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 Toxicity

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

Product: No data available on bioaccumulation.

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

Results of PBT and vPvB assessment: Not available.

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

14 TRANSPORT INFORMATION

IMDG - International Maritime Dangerous Goods Code

UN Number:	UN 2056
UN Proper Shipping Name:	TETRAHYDROFURAN
Transport Hazard Class(es):	3
Subsidiary risk label(s):	–
Packing Group:	II
Label(s):	3
Marine Pollutant:	Not a Marine Pollutant
EmS No.:	F-E; S-D

IATA

UN Number:	UN 2056
Proper Shipping Name:	Tetrahydrofuran
Transport Hazard Class(es):	3
Subsidiary risk label(s):	–
Packing Group:	II
Label(s):	3
Marine Pollutant	Not a Marine Pollutant

15 REGULATORY INFORMATION

Occupational Safety and Health Act
Regulations for the Labeling and Hazard Communication of Hazardous Chemicals
Regulations Governing Road Traffic Safety
Methods and Facilities Standards for the Storage, Clearance and Disposal of Industrial Waste
Standards of Permissible Exposure Limits at Job Site

16 OTHER INFORMATION

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

Information Sources:

1. 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.

Revision Information: Not relevant.
Issue Date: 03-01-2021
SDS No.:
Disclaimer: The information provided in this Safety Data Sheet (SDS) was prepared based on data believed to be accurate as of the date of this SDS. TO THE GREATEST EXTENT PERMITTED BY LAW, AVANTOR PERFORMANCE MATERIALS ("AVANTOR") EXPRESSLY DISCLAIMS ANY AND ALL REPRESENTATIONS AND WARRANTIES REGARDING THE INFORMATION CONTAINED HEREIN INCLUDING, WITHOUT LIMITATION, AS TO ACCURACY, COMPLETENESS, FITNESS FOR PURPOSE OR USE, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY AND STABILITY. This SDS is intended as a guide to the appropriate use, handling, storage and disposal of the product to which it relates by properly trained personnel, and is not intended to be comprehensive. Users of Avantor's products are advised to perform their own tests and to exercise their own judgment to determine the safety, suitability and appropriate use, handling, storage and disposal of each product and product combination for their own purposes and uses. TO THE GREATEST EXTENT PERMITTED BY LAW, AVANTOR DISCLAIMS LIABILITY FOR, AND BY USING AVANTOR'S PRODUCTS PURCHASER AGREES THAT UNDER NO CIRCUMSTANCES SHALL AVANTOR BE LIABLE FOR, SPECIAL, INDIRECT, INCIDENTAL , PUNITIVE OR CONSEQUENTIAL DAMAGES OF ANY TYPE OR KIND, INCLUDING WITHOUT LIMITATION, FOR LOSS OF PROFITS, REPUTATIONAL DAMAGE, PRODUCT RECALL OR BUSINESS INTERRUPTION.