

MATERIAL SAFETY DATA SHEET

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Version 1.6

Section 1 - Product and Company Information

Product Name TETRAHYDROFURAN, 99.9+%, HPLC
GRADE, INHIBITOR-FREE (POLY-COATED
BOTTLE)
Product Number 439215
Brand ALDRICH
Company Sigma-Aldrich
Street Address 3050 Spruce Street
City, State, Zip, Country SAINT LOUIS MO 63103 US
Technical Phone: 314 771 5765
Emergency Phone: 414 273 3850 Ext. 5996
Fax: 800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
TETRAHYDROFURAN	109-99-9	No

Formula C4H8O
Synonyms Agrisynth THF * Butane, 1,4-epoxy- * Butane,
alpha,delta-oxide * Cyclotetramethylene oxide *
Diethylene oxide * 1,4-Epoxybutane * Furanidine *
NCI-C60560 * Oxacyclopentane * Oxolane * RCRA
waste number U213 * Tetrahydrofuraan (Dutch) *
Tetrahydrofuran (ACGIH:OSHA) * Tetrahydrofuranne
(French) * Tetraidrofurano (Italian) *
Tetramethylene oxide
RTECS Number: LU5950000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Flammable (USA) Highly Flammable (EU). Harmful.

May form explosive peroxides. Harmful if swallowed. Irritating to eyes, respiratory system and skin. Limited evidence of a carcinogenic effect.

Possible Carcinogen (US). Target organ(s): Central nervous system. Liver.

HMIS RATING

HEALTH: 2*

FLAMMABILITY: 3

REACTIVITY: 1

NFPA RATING

HEALTH: 2

FLAMMABILITY: 3

REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE

In case of contact, immediately wash skin with soap and copious amounts of water.

EYE EXPOSURE

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures

FLAMMABLE HAZARDS

Flammable Hazards: Yes
Organic Peroxide: Yes

EXPLOSION HAZARDS

Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions.

FLASH POINT

1.4 °F -17 °C Method: closed cup

EXPLOSION LIMITS

Lower: 1.8 % Upper: 11.8 %

AUTOIGNITION TEMP

321 °C

FLAMMABILITY

N/A

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Flammable liquid. Vapor may travel considerable distance to source of ignition and flash back.
Emits toxic fumes under fire conditions.
Specific Method(s) of Fire Fighting: Use water spray to cool fire-exposed containers.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear respirator, chemical safety goggles, rubber boots, and

heavy rubber gloves.

METHODS FOR CLEANING UP

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING

User Exposure: Avoid breathing vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE

Suitable: Keep container closed. Keep away from heat, sparks, and open flame. Store under nitrogen.

SPECIAL REQUIREMENTS

Test for peroxide formation periodically and before distillation. Do not distill to dryness.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	STEL	250 PPM
USA	ACGIH	TWA	200 PPM
USA	MSHA Standard-air	TWA	200 PPM (590 MG/M3)
USA	OSHA.	PEL	8H TWA 200 PPM (590 MG/M3)
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	200 PPM
		STEL	250 PPM

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	600 MG/M3
Poland		NDSch	750 MG/M3
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance

Physical State: Liquid
Color: Colorless

Property

Value At Temperature or Pressure

Molecular Weight

72.11 AMU

pH	N/A	
BP/BP Range	65 - 67 °C	760 mmHg
MP/MP Range	-108 °C	
Freezing Point	N/A	
Vapor Pressure	143 mmHg	20 °C
Vapor Density	2.5 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.889 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	Log Kow: 0.46	20 °C
Decomposition Temp.	N/A	
Flash Point	1.4 °F -17 °C	Method: closed cup
Explosion Limits	Lower: 1.8 % Upper: 11.8 %	
Flammability	N/A	
Autoignition Temp	321 °C	
Refractive Index	1.407	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY

Stable: Stable.

Materials to Avoid: Oxidizing agents, Oxygen.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Nature of decomposition products not known.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE

Skin Contact: Causes skin irritation.

Skin Absorption: May be harmful if absorbed through the skin.

Eye Contact: Causes eye irritation.

Inhalation: Material is irritating to mucous membranes and upper respiratory tract. May be harmful if inhaled.

Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

Central nervous system. Liver. Kidneys.

SIGNS AND SYMPTOMS OF EXPOSURE

Can cause CNS depression. Exposure can cause: Coughing, chest pains, difficulty in breathing. Exposure to high airborne concentrations can cause anesthetic effects. To the best of our knowledge, the chemical, physical, and toxicological properties

have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
1650 mg/kg
LD50

Inhalation
Rat
21,000 ppm
LC50

Remarks: Behavioral:Sleep. Lungs, Thorax, or
Respiration:Respiratory stimulation. Gastrointestinal:Nausea or
vomiting.

Intraperitoneal
Rat
2900 MG/KG
LD50

Intraperitoneal
Mouse
1900 MG/KG
LD50

Oral
Guinea pig
2300 mg/kg
LD50

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that has been
reported to be possibly carcinogenic based on its IARC, ACGIH,
NTP, or EPA classification.

Species: Rat
Route of Application: Inhalation
Dose: 1800 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS
criteria. Kidney, Ureter, Bladder:Tumors.

Species: Mouse
Route of Application: Inhalation
Dose: 1800 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic:Carcinogenic by RTECS criteria. Liver:Tumors.

NTP CARCINOGEN LIST

Rating: Clear evidence.
Species: Mouse
Route: Inhalation

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 5000 PPM/6H

Route of Application: Inhalation
Exposure Time: (6-19D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death,
e.g., stunted fetus).

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Mouse
Dose: 1800 PPM/6H
Route of Application: Inhalation
Exposure Time: (6-17D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g.,
dead and/or resorbed implants per total number of implants).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 2,160 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 24 h
Value: 5,930 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: Tetrahydrofuran
UN#: 2056
Class: 3
Packing Group: Packing Group II
Hazard Label: Flammable liquid
PIH: Not PIH

IATA

Proper Shipping Name: Tetrahydrofuran
IATA UN Number: 2056
Hazard Class: 3
Packing Group: II

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION

Symbol of Danger: F Xi
Indication of Danger: Highly Flammable. Irritant.
R: 11 19 36/37
Risk Statements: Highly flammable. May form explosive peroxides.
Irritating to eyes and respiratory system.
S: 16 29 33

Safety Statements: Keep away from sources of ignition - no smoking. Do not empty into drains. Take precautionary measures against static discharges.

US CLASSIFICATION AND LABEL TEXT

Indication of Danger: Flammable (USA) Highly Flammable (EU). Harmful.

Risk Statements: May form explosive peroxides. Harmful if swallowed. Irritating to eyes, respiratory system and skin. Limited evidence of a carcinogenic effect.

Safety Statements: Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing.

US Statements: Possible Carcinogen (US). Target organ(s): Central nervous system. Liver.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: No

TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION

WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.

DSL: Yes

NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.