



SIGMA-ALDRICH

Material Safety Data Sheet

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Version 1.40

Section 1 - Product and Company Information

Product Name	TETRAHYDROFURAN ANHYDROUS, 99.9%, INHIBITOR-FREE		
Product Number	401757		
Brand	Aldrich Chemical		
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

<u>Substance Name</u>	<u>CAS #</u>	<u>SARA 313</u>
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

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. Possible risk of irreversible effects.
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: Yes **Peroxide Former:** 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

Explosion Limits: Lower: 1.8 % Upper: 11.8 %

Autoignition Temp: 321 °C **Flammability:** Yes

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. 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

Aldrich Chemical - 401757

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Respiratory

NIOSH/MSHA-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

Country	Type
Poland	NDS
Poland	NDSCh
Poland	NDSP

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			check ACGIH TLV
USA	NIOSH	TWA STEL	200 PPM 250 PPM	

Section 9 - Physical/Chemical Properties

Appearance

Color	Form
Colorless	Clear liquid

Molecular Weight: 72.11 AMU

Property Value At Temperature or Pressure

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	
Volatiles%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Partition Coefficient	Log Kow: 0.46	20 °C
Decomposition Temp.	N/A	
Flash Point °F	1.4 °F	
Flash Point °C	-17 °C	
Explosion Limits	Lower: 1.8 % Upper: 11.8 %	
Flammability	N/A	
Autoignition Temp	321 °C	
Refractive Index	1.407	
Solubility	N/A	

Section 10 - Stability and Reactivity

Stability

Stable

Stable.

Materials to Avoid

Oxidizing agents, Oxygen.

Hazardous Decomposition Products

Hazardous Decomposition Products

Carbon monoxide, Carbon dioxide.

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: 1,650 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: 2,300 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.

Rat - Inhalation: 1800 PPM 6H/2Y I

Result: Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Kidney, Ureter, Bladder: Tumors.

Mouse - Inhalation: 1800 PPM 6H/2Y I

Result: Tumorigenic: Carcinogenic by RTECS criteria. Liver: Tumors.

NTP Carcinogen List

<u>Rating</u>	<u>Species</u>	<u>Route</u>
Clear evidence.	Mouse	Inhalation
Some evidence.	Rat	Inhalation

Chronic Exposure - Teratogen

<u>Species</u>	<u>Dose</u>	<u>Route of Application</u>	<u>Exposure Time</u>
Rat	5000 PPM/6H	Inhalation	(6-19D PREG)

Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Chronic Exposure - Reproductive Hazard

<u>Species</u>	<u>Dose</u>	<u>Route of Application</u>	<u>Exposure Time</u>
Mouse	1800 PPM/6H	Inhalation	(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: Value:
96.0 h 2,160 mg/l

Test Type

EC50 Daphnia

Species

Daphnia magna

Time: Value:
24.0 h 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 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.

Risk Statements R: 11 19 36/37

Highly flammable. May form explosive peroxides. Irritating to eyes and respiratory system.

Safety Statements S: 16 29 33

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. Possible risk of irreversible effects.

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.

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. 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 2002 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.