

## MATERIAL SAFETY DATA SHEET

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Version 1.13

## Section 1 - Product and Company Information

Product Name TETRAHYDROFURAN, ANHYDROUS, >=99.9%,  
INHIBITOR-FREE  
Product Number 401757  
Brand ALDRICH  
Company Sigma-Aldrich  
Address 3050 Spruce Street  
SAINT LOUIS MO 63103 US  
Technical Phone: 800-325-5832  
Fax: 800-325-5052  
Emergency Phone: 314-776-6555

## Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
TETRAHYDROFURAN (Inhibitor free)	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). Irritant.  
May form explosive peroxides. Irritating to eyes and respiratory  
system.  
Possible Carcinogen (US). Target organ(s): Nerves. Liver.

## HMIS RATING

HEALTH: 2\*  
FLAMMABILITY: 3  
REACTIVITY: 3

## NFPA RATING

HEALTH: 2  
FLAMMABILITY: 3  
REACTIVITY: 3

\*additional chronic hazards present.

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

## Section 4 - First Aid Measures

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#### 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.

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### Section 5 - Fire Fighting Measures

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#### FLAMMABLE HAZARDS

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 - 17.0 °C Method: closed cup

#### EXPLOSION LIMITS

Lower: 1.8 % Upper: 11.8 %

#### AUTOIGNITION TEMP

321 °C

#### FLAMMABILITY

N/A

#### EXTINGUISHING MEDIA

Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

#### FIREFIGHTING

Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Specific Hazard(s): Vapor may travel considerable distance to source of ignition and flash back. Flammable liquid. Emits toxic fumes under fire conditions.

Specific Method(s) of Fire Fighting: Use water spray to cool fire-exposed containers.

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### Section 6 - Accidental Release Measures

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#### 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.

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### Section 7 - Handling and Storage

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#### 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.

#### SPECIAL REQUIREMENTS

Test for peroxide formation periodically and before distillation. Do not distill to dryness. Store under inert gas.

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### Section 8 - Exposure Controls / PPE

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#### ENGINEERING CONTROLS

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

#### PERSONAL PROTECTIVE EQUIPMENT

Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air 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	150 MG/M3
Poland		NDSch	300 MG/M3
Poland		NDSP	-

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### 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	65.0 - 67.0 °C	760 mmHg
MP/MP Range	- 108.0 °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 - 17.0 °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

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## Section 10 - Stability and Reactivity

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### 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

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## Section 11 - Toxicological Information

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### ROUTE OF EXPOSURE

Skin Contact: May cause 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: May be harmful if swallowed.

### TARGET ORGAN(S) OR SYSTEM(S)

Liver. Central nervous system. Kidneys.

#### SIGNS AND SYMPTOMS OF EXPOSURE

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Exposure to high airborne concentrations can cause anesthetic effects. Can cause CNS depression. Exposure can cause: Coughing, chest pains, difficulty in breathing.

#### TOXICITY DATA

Oral  
Rat  
1650 mg/kg  
LD50

Inhalation  
Rat  
21,000 ppm  
LC50  
Remarks: Lungs, Thorax, or Respiration:Respiratory stimulation.  
Behavioral:Sleep. 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).

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## Section 12 - Ecological Information

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### 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

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## Section 13 - Disposal Considerations

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### 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.

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## Section 14 - Transport Information

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### 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

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## Section 15 - Regulatory Information

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### 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). Irritant.

Risk Statements: May form explosive peroxides. Irritating to eyes and respiratory system.

Safety Statements: Keep away from sources of ignition - no smoking. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Do not empty into drains. Take precautionary measures against static discharges.

Wear suitable protective clothing.

US Statements: Possible Carcinogen (US). Target organ(s): Liver. Nerves.

#### 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

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#### Section 16 - Other Information

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#### 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 2007 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.