

# SAFETY DATA SHEET

Version 6.16  
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## SECTION 1: Identification of the substance/mixture and of the company/undertaking

### 1.1 Product identifiers

Product name : Tetrahydrofuran

Product Number : 401757  
Brand : Sigma-Aldrich  
Index-No. : 603-025-00-0  
CAS-No. : 109-99-9

### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Synthesis of substances

### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Inc.  
3050 SPRUCE ST  
ST. LOUIS MO 63103  
UNITED STATES

Telephone : +1 314 771-5765  
Fax : +1 800 325-5052

### 1.4 Emergency telephone

Emergency Phone # : 800-424-9300 CHEMTREC (USA) +1-703-  
527-3887 CHEMTREC (International) 24  
Hours/day; 7 Days/week

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## SECTION 2: Hazards identification

### 2.1 Classification of the substance or mixture

#### GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225  
Acute toxicity, Oral (Category 4), H302  
Eye irritation (Category 2A), H319  
Carcinogenicity (Category 2), H351  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, Central nervous system, H335, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal Word	Danger
Hazard statement(s)	
H225	Highly flammable liquid and vapor.
H302	Harmful if swallowed.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
H351	Suspected of causing cancer.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS

May form explosive peroxides.  
May form explosive peroxides.

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## SECTION 3: Composition/information on ingredients

### 3.1 Substances

Synonyms : THF

Formula : C<sub>4</sub>H<sub>8</sub>O  
 Molecular weight : 72.11 g/mol  
 CAS-No. : 109-99-9  
 EC-No. : 203-726-8  
 Index-No. : 603-025-00-0

Component	Classification	Concentration
<b>Tetrahydrofuran</b>		
	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2A; Carc. 2; STOT SE 3; H225, H302, H319, H351, H335, H336 Concentration limits: >= 25 %: Eye Irrit. 2, H319; >= 25 %: STOT SE 3, H335;	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

## SECTION 4: First aid measures

### 4.1 Description of first-aid measures

#### General advice

Show this material safety data sheet to the doctor in attendance.

#### If inhaled

After inhalation: fresh air. Call in physician.

#### In case of skin contact

In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/ shower. Consult a physician.

#### In case of eye contact

After eye contact: rinse out with plenty of water. Call in ophthalmologist. Remove contact lenses.

#### If swallowed

After swallowing: immediately make victim drink water (two glasses at most). Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

### 4.3 Indication of any immediate medical attention and special treatment needed

No data available

## SECTION 5: Firefighting measures

### 5.1 Extinguishing media

#### Suitable extinguishing media

Carbon dioxide (CO<sub>2</sub>) Foam Dry powder

### **Unsuitable extinguishing media**

For this substance/mixture no limitations of extinguishing agents are given.

### **5.2 Special hazards arising from the substance or mixture**

Carbon oxides

Combustible.

Pay attention to flashback.

Vapors are heavier than air and may spread along floors.

Development of hazardous combustion gases or vapours possible in the event of fire.

Forms explosive mixtures with air at ambient temperatures.

### **5.3 Advice for firefighters**

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

### **5.4 Further information**

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

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## **SECTION 6: Accidental release measures**

### **6.1 Personal precautions, protective equipment and emergency procedures**

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert. For personal protection see section 8.

### **6.2 Environmental precautions**

Do not let product enter drains. Risk of explosion.

### **6.3 Methods and materials for containment and cleaning up**

Cover drains. Collect, bind, and pump off spills. Observe possible material restrictions (see sections 7 and 10). Take up carefully with liquid-absorbent material (e.g. Chemizorb®). Dispose of properly. Clean up affected area.

### **6.4 Reference to other sections**

For disposal see section 13.

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## **SECTION 7: Handling and storage**

### **7.1 Precautions for safe handling**

#### **Advice on safe handling**

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols.

#### **Advice on protection against fire and explosion**

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

#### **Hygiene measures**

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

For precautions see section 2.2.

### **7.2 Conditions for safe storage, including any incompatibilities**

#### **Storage conditions**

Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition.

Test for peroxide formation periodically and before distillation.

#### **Storage class**

Storage class (TRGS 510): 3: Flammable liquids

#### **7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

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### **SECTION 8: Exposure controls/personal protection**

#### **8.1 Control parameters**

##### **Ingredients with workplace control parameters**

Component	CAS-No.	Value	Control parameters	Basis	
Tetrahydrofuran	109-99-9	TWA	50 ppm	USA. ACGIH Threshold Limit Values (TLV)	
	Remarks	Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption			
		STEL	100 ppm	USA. ACGIH Threshold Limit Values (TLV)	
		Confirmed animal carcinogen with unknown relevance to humans Danger of cutaneous absorption			
		ST	250 ppm 735 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits	
		TWA	200 ppm 590 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits	
		TWA	200 ppm 590 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants	
		PEL	200 ppm 590 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)	
		STEL	250 ppm 735 mg/m <sup>3</sup>	California permissible exposure limits for chemical contaminants (Title 8, Article 107)	

##### **Biological occupational exposure limits**

Component	CAS-No.	Parameters	Value	Biological specimen	Basis	
Tetrahydrofuran	109-99-9	Tetrahydrofuran	2 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)	
	Remarks	End of shift (As soon as possible after exposure ceases)				

## 8.2 Exposure controls

### Appropriate engineering controls

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

### Personal protective equipment

#### Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Safety glasses

#### Skin protection

This recommendation applies only to the product stated in the safety data sheet, supplied by us and for the designated use. When dissolving in or mixing with other substances and under conditions deviating from those stated in EN374 please contact the supplier of CE-approved gloves (e.g. KCL GmbH, D-36124 Eichenzell, Internet: [www.kcl.de](http://www.kcl.de)).

Splash contact

Material: butyl-rubber

Minimum layer thickness: 0.7 mm

Break through time: 10 min

Material tested:Butoject® (KCL 898)

#### Body Protection

Flame retardant antistatic protective clothing.

#### Respiratory protection

required when vapours/aerosols are generated. Our recommendations on filtering respiratory protection are based on the following standards: DIN EN 143, DIN 14387 and other accompanying standards relating to the used respiratory protection system.

#### Control of environmental exposure

Do not let product enter drains. Risk of explosion.

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## SECTION 9: Physical and chemical properties

### 9.1 Information on basic physical and chemical properties

- |  |  |
|--|--|
| a) Appearance                              | Form: liquid, clear<br>Color: colorless                            |
| b) Odor                                    | ether-like   |
| c) Odor Threshold                          | No data available  |
| d) pH                                      | ca.7   |
| e) Melting point/freezing point            | Melting point: -108.44 °C (-163.19 °F) at 1,013.25 hPa -<br>(ECHA) |
| f) Initial boiling point and boiling range | 65 °C 149 °F at 1,013 hPa  |
| g) Flash point                             | -21.2 °C (-6.2 °F) - closed cup - DIN 51755 Part 1                 |
| h) Evaporation rate                        | No data available  |
| i) Flammability (solid, gas)               | No data available  |

j)	Upper/lower flammability or explosive limits	Upper explosion limit: 11.8 %(V) - (THF) Lower explosion limit: 1.8 %(V) - (THF)
k)	Vapor pressure	170 hPa at 20.0 °C (68.0 °F)
l)	Vapor density	ca.2.5 at 25 °C(77 °F) - (Air = 1.0)
m)	Density	0.88 g/cm3 at 25 °C (77 °F)
	Relative density	No data available
n)	Water solubility	miscible
o)	Partition coefficient: n-octanol/water	log Pow: 0.45 at 25 °C (77 °F) - Bioaccumulation is not expected.
p)	Autoignition temperature	215 °C (419 °F) at 1,013 hPa - DIN 51794
q)	Decomposition temperature	No data available
r)	Viscosity	0.518 mm <sup>2</sup> /s at 25 °C (77 °F) -
s)	Explosive properties	No data available
t)	Oxidizing properties	none

## 9.2 Other safety information

Surface tension	26.4 mN/m at 25 °C (77 °F)
Relative vapor density	ca.2.5 at 25 °C (77 °F) - (Air = 1.0)

## SECTION 10: Stability and reactivity

### 10.1 Reactivity

Formation of peroxides possible.  
Vapors may form explosive mixture with air.

### 10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) .  
Stable under recommended storage conditions.  
Test for peroxide formation before distillation or evaporation. Test for peroxide formation or discard after 1 year.

### 10.3 Possibility of hazardous reactions

Vapors may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks.  
Warming.  
Moisture.

### 10.5 Incompatible materials

rubber, various plastics, Tin

## **10.6 Hazardous decomposition products**

Peroxides

In the event of fire: see section 5

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## **SECTION 11: Toxicological information**

### **11.1 Information on toxicological effects**

#### **Acute toxicity**

LD50 Oral - Rat - male and female - 1,650 mg/kg

Remarks: (ECHA)

Symptoms: Irritation of mucous membranes

Inhalation: Irritating to respiratory system.

Symptoms: mucosal irritations, Cough, Shortness of breath, Possible damages:, damage of respiratory tract

Dermal: No data available

#### **Skin corrosion/irritation**

Repeated or prolonged exposure may cause skin irritation and dermatitis, due to degreasing properties of the product.

#### **Serious eye damage/eye irritation**

Eyes - Rabbit

Result: Eye irritation

Remarks: (IUCLID)

#### **Respiratory or skin sensitization**

Sensitisation test: - Guinea pig

Result: negative

Remarks: (IUCLID)

Human experience

Result: negative

Remarks: (IUCLID)

#### **Germ cell mutagenicity**

Test Type: Ames test

Result: negative

Remarks: (IUCLID)

#### **Carcinogenicity**

Suspected of causing cancer.

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Tetrahydrofuran)

NTP: No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

#### **Reproductive toxicity**

No data available

#### **Specific target organ toxicity - single exposure**

May cause respiratory irritation. - Respiratory system

May cause drowsiness or dizziness.

#### **Specific target organ toxicity - repeated exposure**

No data available

## **Aspiration hazard**

No data available

## **11.2 Additional Information**

RTECS: LU5950000

irritant effects, Cough, Shortness of breath, narcosis, somnolence

In high doses:

somnolence  
narcosis

Other dangerous properties can not be excluded.

This substance should be handled with particular care.

Stomach - Irregularities - Based on Human Evidence

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## **SECTION 12: Ecological information**

### **12.1 Toxicity**

Toxicity to fish	flow-through test LC50 - Pimephales promelas (fathead minnow) - 2,160 mg/l - 96 h (OECD Test Guideline 203)
Toxicity to daphnia and other aquatic invertebrates	static test EC50 - Daphnia magna (Water flea) - 3,485 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	Cell multiplication inhibition test IC5 - Scenedesmus quadricauda (Green algae) - 3,700 mg/l - 8 d Remarks: (maximum permissible toxic concentration)
Toxicity to bacteria	static test IC50 - activated sludge - 460 mg/l - 3 h (OECD Test Guideline 209)

### **12.2 Persistence and degradability**

Biodegradability aerobic Biochemical oxygen demand - Exposure time 28 d  
Result: 39 % - Not readily biodegradable.  
(OECD Test Guideline 301D)

### **12.3 Bioaccumulative potential**

No data available

### **12.4 Mobility in soil**

No data available

### **12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### **12.6 Endocrine disrupting properties**

No data available

## **12.7 Other adverse effects**

No data available

### **SECTION 13: Disposal considerations**

### 13.1 Waste treatment methods

## Product

Waste material must be disposed of in accordance with the national and local regulations. Leave chemicals in original containers. No mixing with other waste. Handle uncleaned containers like the product itself. See [www.retrologistik.com](http://www.retrologistik.com) for processes regarding the return of chemicals and containers, or contact us there if you have further questions.

## **SECTION 14: Transport information**

**DOT (US)**

UN number: 2056 Class: 3 Packing group: II  
Proper shipping name: Tetrahydrofuran

Proper shipping name: Tetrahydrofuran  
Reportable Quantity (RQ): 1000 lbs  
Poison Inhalation Hazard: No

IMDG

UN number: 2056 Class: 3 Packing group: II EMS-No: F-E, S-D  
Proper shipping name: TETRAHYDROFURAN

IATA

**IATA** UN number: 2056 Class: 3 Proper shipping name: Tetrahydrofuran Packing group: II

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**SECTION 15: Regulatory information**

## SARA 302 Components

This material does not contain any components with a section 302 EHS TPO.

## SARA 313 Components

**SARA 313 Components**  
This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

SABA 311/312 Hazards

## **SAR 311, 312 Hazards**

## Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act

## **SECTION 16: Other information**

#### **Further information**

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

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