

SAFETY DATA SHEET

TETRAHYDROFURAN 99.9% ACS Grade

Revision 1 09/21/2020

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Trade name : TETRAHYDROFURAN
CAS Number: : 109-99-9
Chemical characterization : Oxygen substituted cyclic hydrocarbons
Chemical name : Tetrahydrofuran
Synonyms : Tetramethylene Oxide, THF

Identified uses : Monomer; Solvent

Prohibited uses : Pharmaceutical excipient

Company Address

Terrace Packaging
2819 Southwest BLVD
Kansas City, MO 64108
USA

Emergency telephone number

(913) 708-3935 USA

Email Address: : terracepackaging@gmail.com

2. HAZARDS IDENTIFICATION

GHS-Classification

Flammable liquids	Category 2
Acute toxicity	Category 4
Serious eye damage/eye irritation	Category 1
Specific target organ toxicity - single exposure	Category 3

GHS-Labeling

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Symbol(s)

:



Signal word

: Danger

Hazard Statements

: H225
H302
H318
H335
H336

Highly flammable liquid and vapour.
Harmful if swallowed.
Causes serious eye damage.
May cause respiratory irritation.
May cause drowsiness or dizziness.

Precautionary Statements

: **Prevention:**

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/ vapours/ spray.

P264

Wash hands 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.

Response:

P370 + P378

In case of fire: Use dry chemical, carbon dioxide, water spray, or alcohol-resistant foam.

P301 + P312 + P330

IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.

P303 + P361 + P353

IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.

P304 + P340 + P312

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/ physician if you feel unwell.

P305 + P351 + P338 + P310

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.

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Storage:

P403 + P235
P405

Store in a well-ventilated place. Keep cool.
Store locked up.

Disposal:

P501

Dispose of contents/ container to an
approved waste disposal plant.

Other hazards

No additional information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances**Components**

Chemical name	CAS-No. EC-No.	<u>Weight %</u>	Component Type
Tetrahydrofuran	109-99-9	>= 99.0 %	A

Key:

(A) Substance

4. FIRST AID MEASURES

General advice

: Take proper precautions to ensure your own health and safety before attempting rescue and providing first aid.
Move out of dangerous area.
Remove contaminated shoes and clothing.
Consult a physician.
Show this material safety data sheet to the doctor in attendance.

If inhaled

: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Do not leave the victim unattended.
Keep patient warm and at rest.
Get immediate medical advice/ attention.
If breathing is difficult, give oxygen.
If breathing has stopped, apply artificial respiration.

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In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.
Remove/Take off immediately all contaminated clothing.
Get medical attention immediately if irritation develops and persists.

In case of eye contact : Rinse immediately with plenty of water for at least 15 minutes.
Remove contact lenses, if present and easy to do. Continue rinsing.
Seek immediate medical attention, preferably an ophthalmologist.

If swallowed : Rinse mouth with water.
Do NOT induce vomiting.
Do not give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If a person vomits when lying on his back, place him in the recovery position.
Get immediate medical advice/ attention.

Notes to physician

Symptoms : Eye damage
respiratory tract irritation
central nervous system effects

Hazards : May be harmful if swallowed and enters airways.
Harmful if swallowed.
Causes serious eye damage.
May cause respiratory irritation.
May cause drowsiness or dizziness.

Treatment : Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient.
If ingested, this material presents a significant aspiration/chemical pneumonitis hazard.
Do not induce vomiting.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media : SMALL FIRE: Use dry chemicals, CO₂, water spray or alcohol-resistant foam

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	LARGE FIRE: Use water spray, water fog or alcohol-resistant foam
Unsuitable extinguishing media	: Do not use solid water stream.
Specific hazards during fire fighting	: Fine sprays/mists may be combustible at temperatures below normal flash point. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Vapors may be heavier than air. May travel long distances along the ground before igniting and flashing back to vapor source. Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Move containers from fire area if it can be done without risk. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. Always stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
Special protective equipment for fire-fighters	: Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighter's protective clothing will only provide limited protection.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	: Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapors accumulating to form explosive concentrations. Vapors can accumulate in low areas.
Environmental precautions	: Prevent product from entering drains. Prevent further leakage or spillage if safe to do so.
Methods for containment / Methods for cleaning up	: Eliminate all sources of ignition. All equipment used when handling this product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas.

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A vapor suppressing foam may be used to reduce vapors.
Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
Use clean non-sparking tools to collect absorbed material.

7. Handling and storage

Precautions for safe handling

Advice on safe handling : For industrial use only.
Keep container tightly closed when not in use.
Extinguish all ignition sources.
Wear recommended personal protective equipment.
Containers must be properly grounded before beginning transfer.
All electrical equipment should be grounded and conform to applicable electric codes and regulatory requirements.
Check atmosphere for explosiveness and oxygen deficiencies.
Observe precautions pertaining to confined space entry.
If below desired level, add extra inhibitor/mix well to be effective.
Carefully vent any internal pressure before removing closure.
Isolate, vent, drain, wash and purge systems or equipment before maintenance or repair.
Handle empty containers with care; vapor/residue may be flammable.
Avoid contact with skin and eyes.
Smoking, eating and drinking should be prohibited in the application area.
Take precautionary measures against static discharges.

Fire-fighting class : Highly flammable liquid.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Store closed drums with bung in up position.
Store only in tightly closed, properly vented containers away from heat, sparks, open flame and strong oxidizing agents.
Vapor space above stored liquid may be flammable/explosive unless blanketed with inert gas.
Can self-react/polymerize/liberate heat/raising temperature, pressure/possibly rupture container unless properly inhibited.
Storage in carbon steel is recommended.

Specific end use(s)

: See Section 1.

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8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Ingredients with workplace control parameters

Occupational Exposure Limits

Components	CAS-No.	Type	Limit Value	Basis Revision Date	Additional Information
Tetrahydrofuran	109-99-9	STEL	100 ppm	US (ACGIH) 2012	
Tetrahydrofuran	109-99-9	TWA	50 ppm	US (ACGIH) 2012	
Tetrahydrofuran	109-99-9	TWA	100 ppm 295 mg/m ³	NOHSC (AU) August 31, 2005	

Consult local authorities for acceptable exposure limits.

Biological Exposure Indices

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Concentration	Basis
Tetrahydrofuran	109-99-9	Tetrahydrofuran	urine	end of shift	2 mg/l	ACGIH_BEL S

Exposure controls

Engineering measures

Electrical equipment should be grounded and conform to applicable electrical code.
Provide local exhaust or general room ventilation to minimize exposure to vapors.
Both local exhaust and good general room ventilation must be provided not only to control exposure but also to prevent formation of flammable mixtures.

Personal protective equipment

Respiratory protection : If exposure can potentially exceed the exposure limit(s), respiratory protection recommended or approved by appropriate local, state or international agency must be used.

Eye and face protection : Eye protection such as chemical splash goggles and/or face shield must be worn when possibility exists for eye contact due to splashing or spraying liquid, airborne particles, or vapor.

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Skin and body protection	: Depending on the conditions of use, protective gloves, apron, boots, head and face protection should be worn.
Hygiene measures	: Selection of appropriate personal protective equipment should be based on an evaluation of the performance characteristics of the protective equipment relative to the task(s) to be performed, conditions present, duration of use, and the hazards and/or potential hazards that may be encountered during use. Emergency eye wash fountains and safety showers should be available in the immediate vicinity of any potential exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Use good personal hygiene practices. Take off contaminated clothing and wash before reuse. When using do not eat, drink or smoke.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	: liquid at 20 °C (1,013 hPa)
Color	: clear colorless
Odor	: ether-like
Odor Threshold	: No value available.
Flash point	: -21.2 °C Method: (Abel-Pensky method)
Lower explosion limit	: ~ 2 vol%
Upper explosion limit	: ~ 11 vol%
Flammability (solid, gas)	: Highly flammable liquid.
Oxidizing properties	: No Data Available.
Autoignition temperature	: ~ 215 °C
Molecular weight	: 72 g/mol
Decomposition temperature	: not determined
Melting point/range	: -108.29 °C
Boiling point/boiling range	: 65.15 °C

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Vapor pressure	: 170 hPa at 20 °C
Density	: 0.883 g/cm ³ at 25 °C
Water solubility	: Miscible in water.
Partition coefficient: n-octanol/water	: log Pow: 0.45 at 25 °C
Viscosity, kinematic	: 0.516 mm ² /s at 25 °C 0.407 mm ² /s at 50 °C
Relative vapor density	: no data available
Explosive properties	: no data available
Other Information	: No additional information available.

10. STABILITY AND REACTIVITY

Reactivity	: May react with oxygen to form unstable peroxides. Peroxides are thermally unstable and shock sensitive.
Chemical stability	: This product is stable with an appropriate level of Butylated Hydroxy Toluene inhibitor (minimum 200 ppm), but reactive (unstable) without. Contact a company sales representative for information regarding adequate inhibitor levels and methods of making inhibitor level determinations.
Hazardous reactions	: May react with oxygen to form unstable peroxides. Peroxides are thermally unstable and shock sensitive. This product is stable with an appropriate level of Butylated Hydroxy Toluene inhibitor (minimum 200 ppm), but reactive (unstable) without. Contact a company sales representative for information regarding adequate inhibitor levels and methods of making inhibitor level determinations.
Conditions to avoid	: Heat, sparks, open flame, other ignition sources, and oxidizing conditions.
Materials to avoid	: Reacts vigorously with strong oxidizers and acids.
Hazardous decomposition	: No additional information available.

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products

Thermal decomposition : Thermal decomposition may produce carbon monoxide and other toxic vapors.

11. TOXICOLOGICAL INFORMATION

Product Summary : The below given information is based on the assessment of the product including impurities.

Acute toxicity

Acute oral toxicity : Classified
Harmful if swallowed.

: LD50: 1,650 mg/kg
Species: Rat

Acute inhalation toxicity : Based on acute toxicity values, not classified.

: LC50: > 14.7 mg/l
Exposure time: 6 HOUR
Species: Rat

Acute dermal toxicity : Based on acute toxicity values, not classified.

: LD50: > 2,000 mg/kg
Species: Rat

Skin corrosion/irritation : Based on skin irritation values, not classified.

Serious eye damage/eye irritation : Classified
Causes serious eye damage.

Respiratory or skin sensitization : Skin sensitization
Based on skin sensitization values, not classified.

: Respiratory sensitization
Not classified
No study available.

Chronic toxicity

Carcinogenicity : Not classified

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Contains a substance that has a positive carcinogenicity study.
High life-time exposures of tetrahydrofuran induced liver tumors in female mice by a non-genotoxic mode of action. At exposures that do not produce sustained liver injury, tumor development is of low concern. Increased kidney tumors in male rats occurred by a mode of action not relevant for human health.

Germ cell mutagenicity : Not classified
No adverse effect observed.

Reproductive toxicity

Effects on fertility / : Not classified
Effects on or via lactation : No adverse effect observed.

Effects on Development : Not classified
No adverse effect observed.

Target Organ Systemic Toxicant - Single exposure

: Classified, May cause respiratory irritation., May cause drowsiness or dizziness.
: Exposure routes: Inhalation
Target Organs: Respiratory system, Central nervous system

Target Organ Systemic Toxicant - Repeated exposure

: Based on repeated exposure toxicity values, not classified.

Aspiration hazard

: Not classified
May be harmful if swallowed and enters airways.

12. Ecological information

Ecotoxicology Assessment

Short-term (acute) aquatic hazard : Based on acute aquatic toxicity values, not classified.
Long-term (chronic) aquatic hazard : Not classified, based on conclusive test data.
Toxicity to fish : Low acute toxicity to fish

Toxicity to daphnia and other aquatic invertebrates : Low acute toxicity to aquatic invertebrates.

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Toxicity to algae : Low toxicity to algae.

Toxicity to bacteria : Low toxicity to sewage microbes.

Toxicity to fish (Chronic toxicity) : Low chronic toxicity to fish.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : No Data Available.

Persistence and degradability

Biodegradability : Inherently biodegradable.

: Biodegradation: 39 %
Testing period: 28 d

: Biodegradation: 61 %
Testing period: 52 d

Stability in water tetrahydrofuran : Not expected to hydrolyze readily.

Bioaccumulative potential

Bioaccumulation : This material is not expected to bioaccumulate.

: Bioconcentration factor (BCF): 3.16
Method: (QSAR calculated value)

Mobility in soil

Distribution among environmental compartments : Type: Stability in soil
Koc: 18
Low potential for soil adsorption expected (based on QSAR calculation of Koc)

: Type: Stability in water
No significant hydrolysis is expected
Molecular structure includes no hydrolysable functional groups.

Other adverse effects

Environmental fate and pathways : No additional information available.

Other information

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Additional ecological information : No additional information available.

13. Disposal considerations

Waste treatment methods

Product : Contaminated product, soil or water may be hazardous waste due to potentially low flash point.
Comply with applicable local, state or international regulations concerning solid or hazardous waste disposal and/or container disposal.

14. TRANSPORT INFORMATION

IMDG

UN number : 2056
Description of the goods : TETRAHYDROFURAN
Class : 3
Packing group : II
Labels : 3
EmS Number 1 : F-E
EmS Number 2 : S-D
Marine pollutant : no

BLG (MARPOL Annex II)

Description of the goods : TETRAHYDROFURAN
Pollution category : Z
Ship type : 3

IATA

UN number : 2056
Description of the goods : TETRAHYDROFURAN
Class : 3
Packing group : II
Labels : 3
Packing instruction (cargo aircraft) : 307

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15. REGULATORY INFORMATION

Other international regulations

Global Inventory Status

The ingredients of this product are compliant with the following chemical inventory requirements or exemptions.

*Additional Explanatory Status Statements follow the table, as necessary.

Country/Region	Inventory	Status Description
Australia	AICS	Compliant
Canada	DSL	Compliant
China	IECSC	Compliant
Europe	REACH	See REACH Compliance Statement
Japan	ENCS	Compliant
Korea	KECI	Compliant
New Zealand	NZIoC	Compliant
Philippines	PICCS	Compliant
United States of America	TSCA	Compliant
Taiwan	TCSCA	Compliant

REACH status

If the product has been purchased from any company of the Terrace Packaging group of companies registered in the European Union, we confirm that the chemical substance in this product has been registered under REACH, in accordance with the deadlines set forth in REACH. (Regulation (EU) No. 1907/2006)

*NOHSC Labeling Information., SUSDP Labeling Information:, Material SUSDP Schedule: None Allocated, Australian Hazchem Code: 2SE, Australia Emergency Guide: GTEPG 3A1

16. OTHER INFORMATION

Disclaimer

Information in this document is accurate to the best of our knowledge at the date of publication. The document is designed to provide users general information for safe handling, use, processing, storage, transportation, disposal and release and does not constitute any warranty or quality specification, either express or implied, including any warranty of merchantability or fitness for any particular purpose. Users shall determine whether the product is suitable for their use and can be used safely and legally.

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Numerical Data Presentation

The presentation of numerical data, such as that used for physical and chemical properties and toxicological values, is expressed using a comma (,) to separate digits into groups of three and a period (.) as the decimal marker. For example, 1,234.56 mg/kg = 1 234,56 mg/kg.

End of Material Safety Data Sheet