



# Safety Data Sheet

## Tetrahydrofuran

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### 1. Identification

#### Product identifier used on the label

## Tetrahydrofuran

#### Recommended use of the chemical and restriction on use

Recommended use\*: industrial chemicals

\* The "Recommended use" identified for this product is provided solely to comply with a Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

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

##### Company:

GreenChem Industries LLC  
222 Clematis St, #207  
West Palm Beach, FL 33401

Telephone: 561-659-2236

#### Emergency telephone number

CHEMTREC: 1-800-424-9300 / 1-703-741-5500

#### Other means of identification

Molecular formula: C(4)H(8)O  
Chemical family: No data available.  
Synonyms: Tetrahydrofuran

### 2. Hazards Identification

#### According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

#### Classification of the product

Flam. Liq.	2	Flammable liquids
Acute Tox.	4 (oral)	Acute toxicity
Eye Dam./Irrit.	1	Serious eye damage/eye irritation
Carc.	2	Carcinogenicity
STOT SE	3 (Vapours may cause drowsiness and dizziness.)	Specific target organ toxicity — single exposure

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STOT SE

3 (irritating to  
respiratory system)

Specific target organ toxicity — single exposure

### Label elements

Pictogram:



Signal Word:

Danger

Hazard Statement:

H225	Highly flammable liquid and vapour.
H318	Causes serious eye damage.
H302	Harmful if swallowed.
H336	May cause drowsiness or dizziness.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.

Precautionary Statements (Prevention):

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P271	Use only outdoors or in a well-ventilated area.
P201	Obtain special instructions before use.
P243	Take precautionary measures against static discharge.
P202	Do not handle until all safety precautions have been read and understood.
P241	Use explosion-proof electrical/ventilating/lighting/equipment.
P260	Do not breathe dust/gas/mist/vapours.
P270	Do not eat, drink or smoke when using this product.
P264	Wash with plenty of water and soap thoroughly after handling.
P240	Ground/bond container and receiving equipment.
P242	Use only non-sparking tools.

Precautionary Statements (Response):

P310	Immediately call a POISON CENTER or doctor/physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P301 + P330	IF SWALLOWED: rinse mouth.
P370 + P378	In case of fire: Use water spray, dry powder, foam or carbon dioxide for extinction.

Precautionary Statements (Storage):

P233	Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.

Precautionary Statements (Disposal):

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P501 Dispose of contents/container to hazardous or special waste collection point.

### Hazards not otherwise classified

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture.

Labeling of special preparations (GHS):  
May form explosive peroxides.

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### 3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

<u>CAS Number</u>	<u>Weight %</u>	<u>Chemical name</u>
109-99-9	>= 99.95 - <= 100.0%	tetrahydrofuran

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### 4. First-Aid Measures

#### Description of first aid measures

##### General advice:

Immediately remove contaminated clothing. If danger of loss of consciousness, place patient in recovery position and transport accordingly. Apply artificial respiration if necessary. First aid personnel should pay attention to their own safety.

##### If inhaled:

Remove the affected individual into fresh air and keep the person calm. Assist in breathing if necessary. Immediate medical attention required.

##### If on skin:

Wash affected areas thoroughly with soap and water. Immediate medical attention required.

##### If in eyes:

In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water. Immediate medical attention required.

##### If swallowed:

Rinse mouth and then drink plenty of water. Do not induce vomiting. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Immediate medical attention required.

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

Symptoms: Overexposure may cause:, nausea, headache, dizziness

The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11., Further symptoms are possible

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

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### Note to physician

Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

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## 5. Fire-Fighting Measures

### Extinguishing media

Suitable extinguishing media:  
water spray, dry powder, foam, carbon dioxide

Unsuitable extinguishing media for safety reasons:  
water jet

### Special hazards arising from the substance or mixture

Hazards during fire-fighting:

Substance/product is dangerous when exposed to heat or flames. If product is heated above decomposition temperature, toxic vapours will be released.

### Advice for fire-fighters

Protective equipment for fire-fighting:

Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

### Further information:

Cool endangered containers with water-spray. Vapours are heavier than air and may accumulate in low areas and travel a considerable distance up to the source of ignition. Do not allow to enter drains or waterways. Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

In case of fire and/or explosion do not breathe fumes. Vapours are heavier than air and may accumulate in low areas and travel a considerable distance up to the source of ignition. Do not allow to enter drains or waterways.

### Impact Sensitivity:

Remarks: Based on the chemical structure there is no shock-sensitivity.

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## 6. Accidental release measures

### Further accidental release measures:

May form explosive peroxides.

### Personal precautions, protective equipment and emergency procedures

Use personal protective clothing. Information regarding personal protective measures see, section 8. Keep unprotected persons away. Ensure adequate ventilation. Avoid all sources of ignition: heat, sparks, open flame. Breathing protection required. Vapours are heavy and collect in low areas. Avoid contact with the skin, eyes and clothing.

Use antistatic tools. Extinguish sources of ignition nearby and downwind. Breathing protection required. Vapours are heavy and collect in low areas.

### Environmental precautions

This product is regulated by RCRA. This product is regulated by CERCLA ('Superfund'). Notify the responsible authorities of reportable releases to the air, into waterways, soil or sewers.

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### Methods and material for containment and cleaning up

Spills should be contained, solidified, and placed in suitable containers for disposal.

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## 7. Handling and Storage

### Precautions for safe handling

Keep away from sources of ignition - No smoking. Wear suitable protective clothing and eye/face protection. Handle and open container with care. Prevent contact with air/oxygen (formation of peroxide). Handle under dry inert gas. Use antistatic tools.

Protection against fire and explosion:

Use antistatic tools. Exhaust fans should be explosion proof. May form explosive peroxides.

### Conditions for safe storage, including any incompatibilities

Suitable materials for containers: Carbon steel (Iron), Stainless steel 1.4401, Stainless steel 1.4301 (V2), Aluminium, High density polyethylene (HDPE), tinned carbon steel (Tinplate), glass, Low density polyethylene (LDPE), Galvanized carbon steel (Zinc)

Further information on storage conditions: Keep container tightly closed. Keep under inert gas. Avoid all sources of ignition: heat, sparks, open flame.

Storage stability:

Storage duration: 12 Months

The product is stabilized, the shelf life should be noted.

From the data on storage duration in this safety data sheet no agreed statement regarding the warrantee of application properties can be deduced.

additives:

BHT (CAS Number: 128-37-0)

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## 8. Exposure Controls/Personal Protection

### Components with occupational exposure limits

tetrahydrofuran	OSHA PEL	PEL 200 ppm 590 mg/m <sup>3</sup> ; STEL value 250 ppm 735 mg/m <sup>3</sup> ; TWA value 200 ppm 590 mg/m <sup>3</sup> ;
	ACGIH TLV	STEL value 100 ppm ; Skin Designation ; The substance can be absorbed through the skin. TWA value 50 ppm ;

### Advice on system design:

Provide local exhaust ventilation to maintain recommended P.E.L.

### Personal protective equipment

#### Respiratory protection:

Wear a NIOSH-certified (or equivalent) organic vapour/particulate respirator. Do not exceed the maximum use concentration for the respirator facepiece/cartridge combination. For emergency or non-routine, high exposure situations, use a NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

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### Hand protection:

Chemical resistant protective gloves, Polyethylene-Laminate (PE laminate) - ca. 0.1 mm coating thickness

### Eye protection:

Tightly fitting safety goggles (chemical goggles). Wear face shield if splashing hazard exists.

### Body protection:

Body protection must be chosen depending on activity and possible exposure, e.g. head protection, apron, protective boots, chemical-protection suit.

### General safety and hygiene measures:

Eye wash fountains and safety showers must be easily accessible. Wear protective clothing as necessary to prevent contact. Avoid inhalation of vapour. Airborne monitoring should be conducted to assure that the PEL/TLV is not exceeded. When using, do not eat, drink or smoke. Hands and/or face should be washed before breaks and at the end of the shift. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. Store work clothing separately.

## 9. Physical and Chemical Properties

Form:	liquid	
Odour:	ether-like	
Odour threshold:	Not determined due to potential health hazard by inhalation.	
Colour:	colourless	
pH value:	7	
Melting point:	-108.5 °C	
Boiling point:	65.5 - 66.5 °C	
Flash point:	-22 °C	
Flammability:	Highly flammable liquid and vapour.	
Lower explosion limit:	2.3 %(V) ( -19.0 °C) Literature data.	(air)
Upper explosion limit:	For liquids not relevant for classification and labelling.	
Autoignition:	230 °C	(DIN 51794)
Vapour pressure:	173 mbar ( 20 °C) 586 mbar ( 50 °C)	
Density:	0.887 g/cm <sup>3</sup> ( 20 °C) 0.8511 g/cm <sup>3</sup> ( 55 °C)	
Relative density:	0.883 ( 20 °C)	
Bulk density:	No data available.	
Vapour density:	not determined	
Partitioning coefficient n-octanol/water (log Pow):	0.45 ( 25 °C)	(OECD Guideline 107)
Self-ignition temperature:	Based on its structural properties the product is not classified as self-igniting.	
Thermal decomposition:	110 °C, 20 kJ/kg It is not a self-decomposable substance. 400 °C No exothermic decomposition within the mentioned temperature range.	

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Viscosity, dynamic:	0.456 mPa.s ( 25 °C) Literature data. 0.359 mPa.s ( 50 °C) Literature data.
Particle size:	The substance / product is marketed or used in a non solid or granular form.
Solubility in water:	( 25 °C) miscible, Literature data.
Solubility (qualitative):	miscible solvent(s): organic solvents,
Molar mass:	72.11 g/mol
Evaporation rate:	Value can be approximated from Henry's Law Constant or vapor pressure.

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## 10. Stability and Reactivity

### Reactivity

No hazardous reactions if stored and handled as prescribed/indicated.

Corrosion to metals:

No corrosive effect on metal.

Oxidizing properties:

not fire-propagating

Formation of

flammable gases:

Remarks:

Forms no flammable gases in the presence of water.

### Chemical stability

The product is stable if stored and handled as prescribed/indicated.

### Possibility of hazardous reactions

The product is chemically stable.

Reacts with oxidizing agents.

### Conditions to avoid

Avoid all sources of ignition: heat, sparks, open flame. Avoid electro-static charge.

### Incompatible materials

Aluminium lithium hydride, alkaline-earth metal hydroxides

### Hazardous decomposition products

Decomposition products:

Hazardous decomposition products: No hazardous decomposition products if stored and handled as prescribed/indicated.

Thermal decomposition:

110 °C

It is not a self-decompositionable substance.

400 °C

No exothermic decomposition within the mentioned temperature range.

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### 11. Toxicological information

#### Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

#### Acute Toxicity/Effects

##### Acute toxicity

Assessment of acute toxicity: Of moderate toxicity after single ingestion. Virtually nontoxic by inhalation. Virtually nontoxic after a single skin contact. High concentrations in the air may cause narcosis. The substance can be absorbed through the skin.

##### Oral

Type of value: LD50

Species: rat (male/female)

Value: 1,650 mg/kg

##### Inhalation

Type of value: LC50

Species: rat (male/female)

Value: > 14.7 mg/l

Exposure time: 6 h

The vapour was tested.

##### Dermal

Type of value: LD50

Species: rat (male/female)

Value: > 2,000 mg/kg (OECD Guideline 402)

##### Assessment other acute effects

Assessment of STOT single:

Causes temporary irritation of the respiratory tract. Possible narcotic effects (drowsiness or dizziness).

##### Irritation / corrosion

Assessment of irritating effects: Skin contact causes irritation. May cause severe damage to the eyes. Causes temporary irritation of the respiratory tract.

##### Skin

Species: rabbit

Result: non-irritant

Method: Draize test

##### Eye

Species: rabbit

Result: Risk of serious damage to eyes.

Method: Draize test

##### Sensitization

Assessment of sensitization: Skin sensitizing effects were not observed in animal studies.

Mouse Local Lymph Node Assay (LLNA)

Species: mouse

Result: Non-sensitizing.



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Method: OECD Guideline 429

Aspiration Hazard  
not applicable

### Chronic Toxicity/Effects

#### Repeated dose toxicity

Assessment of repeated dose toxicity: No substance-specific organotoxicity was observed after repeated administration to animals.

#### Genetic toxicity

Assessment of mutagenicity: Results from a number of mutagenicity studies with microorganisms, mammalian cell culture and mammals are available. Taking into account all of the information, there is no indication that the substance is mutagenic.

#### Carcinogenicity

Assessment of carcinogenicity: In long-term studies in rodents exposed to high doses, a tumorigenic effect was found; however, these results are thought to be due to a rodent-specific liver effect that is not relevant to humans. The observed kidney tumors in rats are regarded as a consequence of a species-specific mechanism and thus not relevant for man. No carcinogenic potential can be deduced from other studies with rats and mice.

In long-term animal studies in which the substance was given by inhalation in high concentrations, a carcinogenic effect was observed.

#### Reproductive toxicity

Assessment of reproduction toxicity: The results of animal studies gave no indication of a fertility impairing effect.

#### Teratogenicity

Assessment of teratogenicity: Animal studies gave no indication of a developmental toxic effect at doses that were not toxic to the parental animals.

### Symptoms of Exposure

Overexposure may cause: nausea, headache, dizziness

The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11., Further symptoms are possible

#### Medical conditions aggravated by overexposure

Data available do not indicate that there are medical conditions that are generally recognized as being aggravated by exposure to this substance/product. See MSDS section 11 - Toxicological information.

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## 12. Ecological Information

### Toxicity

#### Aquatic toxicity

Assessment of aquatic toxicity:

There is a high probability that the product is not acutely harmful to aquatic organisms. The inhibition of the degradation activity of activated sludge is not anticipated when introduced to biological treatment plants in appropriate low concentrations.

#### Toxicity to fish

LC50 (96 h) 2,160 mg/l, Pimephales promelas (Fish test acute, Flow through.)

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The statement of the toxic effect relates to the analytically determined concentration. Literature data.

### Aquatic invertebrates

EC50 (48 h) 3,485 mg/l, Daphnia magna (Daphnia test acute)  
Nominal concentration. Literature data.

### Aquatic plants

Toxic limit concentration (8 d) 3,700 mg/l (growth rate), Scenedesmus sp. (DIN 38412 Part 9, static) The details of the toxic effect relate to the nominal concentration. Literature data.

### Chronic toxicity to fish

No observed effect concentration (33 d) 216 mg/l, Pimephales promelas (Flow through.)  
The statement of the toxic effect relates to the analytically determined concentration. Literature data.

### Chronic toxicity to aquatic invertebrates

Study scientifically not justified.

### Assessment of terrestrial toxicity

Study scientifically not justified.

## **Microorganisms/Effect on activated sludge**

### Toxicity to microorganisms

OECD Guideline 209 aquatic  
activated sludge, domestic/EC20 (0.5 h): approx. 800 mg/l  
The details of the toxic effect relate to the nominal concentration.

OECD Guideline 209 aquatic  
activated sludge, domestic/Toxic limit concentration (3 h): 460 mg/l

## **Persistence and degradability**

### Assessment biodegradation and elimination (H2O)

Moderately/partially biodegradable. Easily eliminated from water.

### Elimination information

90 - 100 % BOD of the ThOD (14 d) (OECD Guideline 302 C) (activated sludge)  
Literature data.

39.5 % BOD of the ThOD (28 d) (OECD 301D; EEC 92/69, C.4-E) (activated sludge, domestic)

### Assessment of stability in water

According to structural properties, hydrolysis is not expected/probable.

## **Bioaccumulative potential**

### Assessment bioaccumulation potential

Because of the n-octanol/water distribution coefficient (log Pow) accumulation in organisms is not to be expected.

## **Mobility in soil**

### Assessment transport between environmental compartments

The substance will slowly evaporate into the atmosphere from the water surface.  
Adsorption to solid soil phase is not expected.

## **Additional information**

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Other ecotoxicological advice:  
Do not release untreated into natural waters.

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### 13. Disposal considerations

#### Waste disposal of substance:

Dispose of in a RCRA-licensed facility. Do not discharge into waterways or sewer systems without proper authorization. Dispose of in accordance with national, state and local regulations.

#### Container disposal:

Dispose of in a licensed facility. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers. If containers are not empty, they must be disposed of in a RCRA-licensed facility.

RCRA: U213

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### 14. Transport Information

#### Land transport

USDOT

Hazard class: 3  
Packing group: II  
ID number: UN 2056  
Hazard label: 3  
Proper shipping name: TETRAHYDROFURAN

#### Sea transport

IMDG

Hazard class: 3  
Packing group: II  
ID number: UN 2056  
Hazard label: 3  
Marine pollutant: NO  
Proper shipping name: TETRAHYDROFURAN

#### Air transport

IATA/ICAO

Hazard class: 3  
Packing group: II  
ID number: UN 2056  
Hazard label: 3  
Proper shipping name: TETRAHYDROFURAN

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### 15. Regulatory Information

#### Federal Regulations

#### Registration status:

Chemical TSCA, US released / listed

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**EPCRA 311/312 (Hazard categories):** Chronic; Fire; Acute

<u>CERCLA RQ</u>	<u>CAS Number</u>	<u>Chemical name</u>
1000 LBS	109-99-9	tetrahydrofuran
<b>Reportable Quantity for release:</b>		1,000 lb

### State regulations

<u>State RTK</u>	<u>CAS Number</u>	<u>Chemical name</u>
PA	109-99-9	tetrahydrofuran
NJ	109-99-9	tetrahydrofuran

### **NFPA Hazard codes:**

Health : 3      Fire: 3      Reactivity: 1      Special:

### **Assessment of the hazard classes according to UN GHS criteria (most recent version):**

STOT SE	3 (Vapours may cause drowsiness and dizziness.)	Specific target organ toxicity — single exposure
Acute Tox.	4 (oral)	Acute toxicity
Flam. Liq.	2	Flammable liquids
STOT SE	3 (irritating to respiratory system)	Specific target organ toxicity — single exposure
Carc.	2	Carcinogenicity
Eye Dam./Irrit.	1	Serious eye damage/eye irritation

## 16. Other Information

### **SDS Prepared by:**

GreenChem

Prepared on: 12/1/2017

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

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