

SECTION 1: Identification

1.1. Identification

Product form	: Substance
Substance name	: Tetrahydrofuran (THF)
CAS-No.	: 109-99-9
Formula	: C ₄ H ₈ O
Synonyms	: 1,4-epoxybutane / agrisynth THF / butane, 1,4-epoxy- / butane, alpha,delta-oxide / butylene oxide / cyclotetramethylene oxide / diethylene oxide (=tetrahydrofuran) / furan, tetrahydro- / furanidine / hydrofuran / oxacyclopentane / oxolane / oxyl / tetrahydrofuran / tetramethylene oxide / THF

1.2. Recommended use and restrictions on use

Use of the substance/mixture	: Solvent Laboratory chemical
Recommended use	: Industrial use
Restrictions on use	: No data available

1.3. Supplier

ECOLINK

2177 Flintstone Drive
Suite A
Tucker, GA 30084
770-621-8240 (t)
www.ecolink.com

1.4. Emergency telephone number

Emergency number : **INFOTRAC** 800-535-5053

SECTION 2: Hazard(s) identification

2.1. Classification of the substance or mixture

GHS-US classification

Flammable liquids Category 2	H225	Highly flammable liquid and vapor
Acute toxicity (oral) Category 4	H302	Harmful if swallowed
Serious eye damage/eye irritation Category 2A	H319	Causes serious eye irritation
Carcinogenicity Category 2	H351	Suspected of causing cancer
Specific target organ toxicity (single exposure) Category 3	H335	May cause respiratory irritation

Full text of H statements : see section 16

2.2. GHS Label elements, including precautionary statements

GHS-US labeling

Hazard pictograms (GHS-US) :



Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H225 - Highly flammable liquid and vapor
H302 - Harmful if swallowed
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H351 - Suspected of causing cancer

Precautionary statements (GHS-US) :

P201 - Obtain special instructions before use.
P202 - Do not handle until all safety precautions have been read and understood.
P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No

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smoking.
P233 - Keep container tightly closed.
P240 - Ground/Bond container and receiving equipment
P241 - Use explosion-proof electrical, lighting, ventilating equipment
P242 - Use only non-sparking tools.
P243 - Take precautionary measures against static discharge.
P261 - Avoid breathing dust, fume, gas, mist, spray, vapors.
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 eye protection, face protection, protective clothing, protective gloves.
P301+P312 - If swallowed: Call a POISON CENTER or doctor/physician if you feel unwell
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
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.
P312 - Call a POISON CENTER or doctor/physician if you feel unwell
P330 - Rinse mouth.
P337+P313 - If eye irritation persists: Get medical advice/attention.
P370+P378 - In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) 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 in accordance with local, regional, national, and/or international regulations.

2.3. Other hazards which do not result in classification

No additional information available

2.4. Unknown acute toxicity (GHS US)

Not applicable

SECTION 3: Composition/Information on ingredients

3.1. Substances

Substance type : Mono-constituent

Name	Product identifier	%	GHS-US classification
Tetrahydrofuran (THF) (Main constituent)	(CAS-No.) 109-99-9	99.95 - 100	Flam. Liq. 2, H225 Acute Tox. 4 (Oral), H302 Eye Irrit. 2A, H319 Carc. 2, H351 STOT SE 3, H335

Full text of hazard classes and H-statements : see section 16

3.2. Mixtures

Not applicable

SECTION 4: First-aid measures

4.1. Description of first aid measures

- First-aid measures after inhalation : Remove to fresh air. If not breathing, apply artificial respiration. Do NOT use mouth to mouth method if victim inhaled or ingested the substance. If breathing is difficult, give oxygen provided a qualified individual is present. Get medical attention.
- First-aid measures after skin contact : Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse or discard if they cannot be thoroughly cleaned. Get medical attention.
- First-aid measures after eye contact : Rinse immediately with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Do not apply neutralizing agents. Take victim to an ophthalmologist if irritation persists.
- First-aid measures after ingestion : Do NOT induce vomiting unless directed to do so by medical personnel. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. If victim is conscious and alert, rinse mouth with water, give two glasses of water or activated charcoal slurry. Never give anything by mouth to an unconscious person. Call Poison Center. Consult a doctor/medical service if you feel unwell. Ingestion of large quantities: immediately to hospital.

4.2. Immediate medical attention and special treatment, if necessary

Treat symptomatically.

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SECTION 5: Fire-fighting measures

5.1. Suitable (and unsuitable) extinguishing media

- Suitable extinguishing media : Use water spray, dry chemical, carbon dioxide, or alcohol-resistant foam.
- Unsuitable extinguishing media : Do NOT use solid water stream as it may spread fire.
Use water to cool exposed containers.
Containers may explode in the heat of a fire.

5.2. Specific hazards arising from the chemical

- Fire hazard : Highly flammable liquid and vapor. Gas/vapor flammable with air within explosion limits.
Do not distill or allow product to dry, concentration can form heat sensitive peroxide which can explode. Vapors may form explosive mixture with air. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back. BHT antioxidant is added to the THF to minimize peroxide formation.

5.3. Special protective equipment and precautions for fire-fighters

- Firefighting instructions : Cool tanks/drums with water spray/remove them into safety. Do not move the load if exposed to heat.
- Protection during firefighting : Heat/fire exposure: compressed air/oxygen apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Protective equipment : Gloves. Protective goggles. Protective clothing. Large spills/in enclosed spaces: compressed air apparatus.
- Emergency procedures : Wear personal protection equipment. Avoid contact with skin, eyes and clothing. Ensure adequate ventilation. Keep unnecessary personnel away. Remove all sources of ignition. Use a vapor suppressing foam to reduce vapors.

6.1.2. For emergency responders

- Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

6.2. Environmental precautions

- Prevent spreading in sewers.

6.3. Methods and material for containment and cleaning up

- For containment : Contain released product, pump into suitable containers. Plug the leak, cut off the supply. Dam up the liquid spill. Try to reduce evaporation. Measure the concentration of the explosive gas-air mixture. Dilute/disperse combustible gas/vapor with water curtain. Provide equipment/receptacles with earthing. Do not use compressed air for pumping over spills.
- Methods for cleaning up : Take up liquid spill into absorbent material, e.g.: sand, earth, vermiculite, kieselguhr, powdered limestone. Scoop absorbed substance into closing containers. Carefully collect the spill/leftovers. Damaged/cooled tanks must be emptied. Do not use compressed air for pumping over spills. Clean contaminated surfaces with an excess of water. Take collected spill to manufacturer/competent authority. Wash clothing and equipment after handling.
- Other information : Dispose of materials or solid residues at an authorized site.

6.4. Reference to other sections

- For further information refer to section 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

- Precautions for safe handling : Use spark-/explosionproof appliances and lighting system. Take precautions against electrostatic charges. Keep away from naked flames/heat. Keep away from ignition sources/sparks. Measure the concentration in the air regularly. Work under local exhaust/ventilation. Comply with the legal requirements. Clean contaminated clothing. Handle and open the container with care. Cool before opening. Handle uncleaned empty containers as full ones. Thoroughly clean/dry the installation before use. Do not discharge the waste into the drain. Do not use compressed air for pumping over. Keep container tightly closed. Before use: check for peroxides and eliminate them.
- Hygiene measures : Do not eat, drink or smoke when using this product. Always wash hands after handling the product.

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7.2. Conditions for safe storage, including any incompatibilities

Technical measures	: Ground/bond container and receiving equipment.
Storage conditions	: Store in a well-ventilated place. Keep cool. Keep container tightly closed. Store locked up.
Storage area	: Store in a cool area. Keep out of direct sunlight. Store in a dry area. Store in a dark area. Ventilation at floor level. Fireproof storeroom. Provide for a tub to collect spills. Provide the tank with earthing. Detached building. Store only in a limited quantity. Store only in a stabilized state. May be stored under nitrogen. May be stored under argon. Meet the legal requirements.
Special rules on packaging	: SPECIAL REQUIREMENTS: hermetical. dry. clean. opaque. correctly labelled. meet the legal requirements. Secure fragile packagings in solid containers.
Packaging materials	: SUITABLE MATERIAL: steel. aluminium. iron. dark glass. stoneware/porcelain. MATERIAL TO AVOID: Will attack some forms of plastics, rubbers, and coatings

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Tetrahydrofuran (THF) (109-99-9)		
ACGIH	ACGIH TWA (ppm)	50 ppm
ACGIH	ACGIH STEL (ppm)	100 ppm

8.2. Appropriate engineering controls

Appropriate engineering controls	: Ensure good ventilation of the work station. An emergency eye wash/ shower must be readily accessible to the work area.
Environmental exposure controls	: Avoid release to the environment.

8.3. Individual protection measures/Personal protective equipment

Materials for protective clothing:

GIVE EXCELLENT RESISTANCE: butyl rubber.

GIVE GOOD RESISTANCE: tetrafluoroethylene.

GIVE LESS RESISTANCE: PVA.

GIVE POOR RESISTANCE: butyl rubber. chlorinated polyethylene. natural rubber. nitrile rubber. polyethylene. PVC. neoprene/natural rubber. nitrile rubber/PVC. viton

Hand protection:

Gloves. Recommended glove material: Neoprene coated gloves.

Eye protection:

Safety glasses. Appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin and body protection:

Protective clothing.

Respiratory protection:

Full face mask with filter type A at conc. in air > exposure limit

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state	: Liquid
Appearance	: Liquid.
Color	: Colorless
Odor	: Ether-like
Odor threshold	: No data available
pH	: 7
Melting point/ Freezing point	: -108 °C
Boiling point	: 66 °C
Flash point	: -14.4 - -17 °C

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Relative evaporation rate (butyl acetate=1)	: >1
Flammability (solid, gas)	: Not applicable.
Vapor pressure	: 18.9 kPa (20 °C)
Relative vapor density at 20 °C	: 2.5
Relative density	: 0.888
Specific gravity / density	: 0.89 g/cm ³
Molecular mass	: 72.11 g/mol
Solubility	: Soluble in water. Water: complete
Log Pow	: No data available
Auto-ignition temperature	: 321 °C
Decomposition temperature	: No data available
Viscosity, kinematic	: 0.518 mm ² /s
Viscosity, dynamic	: No data available
Explosion limits	: 2.0 - 11.8 vol %
Explosive properties	: May form explosive peroxides.
Oxidizing properties	: No data available

9.2. Other information

VOC content	: 100 %
Other properties	: Gas/vapour heavier than air at 20°C. Clear. Hygroscopic. Volatile. Neutral reaction. May generate electrostatic charges.

SECTION 10: Stability and reactivity

10.1. Reactivity

Unstabilized product reacts on exposure to air: peroxidation resulting in increased fire or explosion risk. Unstabilized product: on exposure to light: peroxidation resulting in increased fire or explosion risk. Reacts violently with (strong) oxidizers: (increased) risk of fire/explosion. Reacts with (some) bases.

10.2. Chemical stability

Stable at room temperature and under normal conditions.

10.3. Possibility of hazardous reactions

Thermally stable at typical use temperatures. Polymerization will not occur.

10.4. Conditions to avoid

Avoid contact with hot surfaces. Heat. No flames, no sparks. Eliminate all sources of ignition.

10.5. Incompatible materials

Strong oxidizers, strong bases/ acids. Can form potentially explosive peroxides upon long exposure to air.

10.6. Hazardous decomposition products

Carbon oxides.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity (oral)	: Oral: Harmful if swallowed.
Acute toxicity (dermal)	: Not classified
Acute toxicity (inhalation)	: Not classified

Tetrahydrofuran (THF) (109-99-9)	
LD50 oral rat	1650 mg/kg body weight (Rat, Male/female, Experimental value, Oral)
LD50 dermal rat	> 2000 mg/kg body weight (OECD 402: Acute Dermal Toxicity, 24 h, Rat, Male/female, Experimental value, Dermal)
LC50 inhalation rat (mg/l)	> 14.7 mg/l air (Other, 6 h, Rat, Male/female, Experimental value, Inhalation)
ATE US (oral)	1650 mg/kg body weight

Skin corrosion/irritation	: Not classified pH: 7
Serious eye damage/irritation	: Causes serious eye irritation. pH: 7

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Respiratory or skin sensitization	: Not classified
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Suspected of causing cancer.
Reproductive toxicity	: Not classified
Specific target organ toxicity – single exposure	: May cause respiratory irritation.
Specific target organ toxicity – repeated exposure	: Not classified
Aspiration hazard	: Not classified
Viscosity, kinematic	: 0.518 mm ² /s
Potential Adverse human health effects and symptoms	: Practically non-toxic in contact with skin (LD50 skin > 2000 mg/kg). Not irritant to skin. May cause respiratory irritation. Causes serious eye irritation. Caution! Substance is absorbed through the skin.
Symptoms/effects after inhalation	: Coughing. Irritation of the respiratory tract. Irritation of the nasal mucous membranes. Headache. Nausea. EXPOSURE TO HIGH CONCENTRATIONS: Feeling of weakness. Central nervous system depression. Dizziness. Narcosis. Ringing in the ears. Sensorial disturbances. Disturbances of consciousness. Respiratory difficulties.
Symptoms/effects after skin contact	: Not irritating. Red skin.
Symptoms/effects after eye contact	: Irritation of the eye tissue. Redness of the eye tissue.
Symptoms/effects after ingestion	: Dry/sore throat. Risk of aspiration pneumonia. Symptoms similar to those listed under inhalation.
Chronic symptoms	: Enlargement/affection of the liver. Affection of the renal tissue. Visual disturbances. Auditory disturbances.

SECTION 12: Ecological information

12.1. Toxicity

Ecology - water : Not harmful to crustacea. Not harmful to fishes. Groundwater pollutant. Inhibition of activated sludge. Not harmful to algae. Slightly harmful to bacteria.

Tetrahydrofuran (THF) (109-99-9)

LC50 fish 1	2160 mg/l (Equivalent or similar to OECD 203, 96 h, Pimephales promelas, Flow-through system, Fresh water, Experimental value, Lethal)
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12.2. Persistence and degradability

Tetrahydrofuran (THF) (109-99-9)

Persistence and degradability	Biodegradable in the soil. Inherently biodegradable. Not readily biodegradable in water.
Chemical oxygen demand (COD)	1.855 g O ₂ /g substance
ThOD	2.44 g O ₂ /g substance

12.3. Bioaccumulative potential

Tetrahydrofuran (THF) (109-99-9)

Log Pow	0.45 (Experimental value, Equivalent or similar to OECD 107, 25 °C)
Bioaccumulative potential	Low potential for bioaccumulation (Log Kow < 4).

12.4. Mobility in soil

Tetrahydrofuran (THF) (109-99-9)

Surface tension	26.4 N/m (25 °C)
Log Koc	1.26 - 1.37 (log Koc, Experimental value)
Ecology - soil	Highly mobile in soil.

12.5. Other adverse effects

No additional information available

SECTION 13: Disposal considerations

13.1. Disposal methods

Waste treatment methods : Dispose of contents/container in accordance with licensed collector's sorting instructions.

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Product/Packaging disposal recommendations : Do not discharge into drains or the environment. Remove waste in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Remove to an authorized waste incinerator for solvents with energy recovery. Obtain the consent of pollution control authorities before discharging to wastewater treatment plants.

SECTION 14: Transport information

Department of Transportation (DOT)

In accordance with DOT

Transport document description : UN2056 Tetrahydrofuran, 3, II
UN-No.(DOT) : UN2056
Proper Shipping Name (DOT) : Tetrahydrofuran
Class (DOT) : 3 - Class 3 - Flammable and combustible liquid 49 CFR 173.120
Packing group (DOT) : II - Medium Danger
Hazard labels (DOT) : 3 - Flammable liquid



DOT Packaging Non Bulk (49 CFR 173.xxx) : 202
DOT Packaging Bulk (49 CFR 173.xxx) : 242
DOT Special Provisions (49 CFR 172.102) : IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
T4 - 2.65 178.274(d)(2) Normal..... 178.275(d)(3)
TP1 - The maximum degree of filling must not exceed the degree of filling determined by the following: Degree of filling = $97 / 1 + a (tr - tf)$ Where: tr is the maximum mean bulk temperature during transport, and tf is the temperature in degrees celsius of the liquid during filling.
DOT Packaging Exceptions (49 CFR 173.xxx) : None
DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 5 L
DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 60 L
DOT Vessel Stowage Location : B - (i) The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel carrying a number of passengers limited to not more than the larger of 25 passengers, or one passenger per each 3 m of overall vessel length; and (ii) "On deck only" on passenger vessels in which the number of passengers specified in paragraph (k)(2)(i) of this section is exceeded.
Emergency Response Guide (ERG) Number : 127
Other information : No supplementary information available.

Transportation of Dangerous Goods

Not applicable

Transport by sea

Transport document description (IMDG) : UN 2056 TETRAHYDROFURAN, 3, II (< -18°C c.c.)
UN-No. (IMDG) : 2056
Proper Shipping Name (IMDG) : TETRAHYDROFURAN
Class (IMDG) : 3 - Flammable liquids
Packing group (IMDG) : II - substances presenting medium danger
Limited quantities (IMDG) : 1 L
EmS-No. (1) : F-E
EmS-No. (2) : S-D

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Air transport

Transport document description (IATA)	: UN 2056 Tetrahydrofuran, 3, II
UN-No. (IATA)	: 2056
Proper Shipping Name (IATA)	: Tetrahydrofuran
Class (IATA)	: 3 - Flammable Liquids
Packing group (IATA)	: II - Medium Danger

SECTION 15: Regulatory information

15.1. US Federal regulations

Tetrahydrofuran (THF) (109-99-9)

Listed on the United States TSCA (Toxic Substances Control Act) inventory
Not subject to reporting requirements of the United States SARA Section 313

CERCLA RQ	1000 lb
SARA Section 311/312 Hazard Classes	Physical hazard - Flammable (gases, aerosols, liquids, or solids) Health hazard - Carcinogenicity Health hazard - Serious eye damage or eye irritation Health hazard - Specific target organ toxicity (single or repeated exposure)

All components of this product are listed, or excluded from listing, on the United States Environmental Protection Agency Toxic Substances Control Act (TSCA) inventory

15.2. International regulations

CANADA

No additional information available

EU-Regulations

No additional information available

National regulations

No additional information available

15.3. US State regulations

Tetrahydrofuran (THF) (109-99-9)

State or local regulations	U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List
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California Proposition 65 - This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

SECTION 16: Other information

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Revision date : 11/26/2018

Full text of H-phrases:

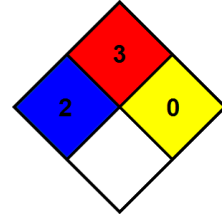
H225	Highly flammable liquid and vapor
H302	Harmful if swallowed
H319	Causes serious eye irritation
H335	May cause respiratory irritation
H351	Suspected of causing cancer

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- NFPA health hazard : 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.
- NFPA fire hazard : 3 - Liquids and solids (including finely divided suspended solids) that can be ignited under almost all ambient temperature conditions.
- NFPA reactivity : 0 - Material that in themselves are normally stable, even under fire conditions.



SDS US (GHS HazCom 2012)

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