PHARMCO
BY GREENFIELD GLOBAL

SAFETY DATA SHEET

1. Identification

Product identifier **TETRAHYDROFURAN (STABILIZED)**

Other means of identification

CAS number 109-99-9

Synonyms THF

Recommended use General purpose solvent.

Recommended restrictions Uses other than the recommended use.

Manufacturer/Importer/Supplier/Distributor information

Company Name Greenfield Global USA Inc. (The technical data referenced below applies to products sold by Greenfield Global Inc., under the names Greenfield Global, Pharmco, and Commercial Alcohols.)

Address 58 Vale Road
Brookfield, CT 06804
USA

Telephone 203.740.3471

Fax 203.740.3481

Company Name Greenfield Global USA Inc.

Address 1101 Isaac Shelby Drive
Shelbyville, KY 40065
USA

Telephone 502.232.7600

Emergency phone number

USA CHEMTREC: +1.800.424.9300 (CCN 17213)

International CHEMTREC: +1.703.527.3887 (CCN 17213)

2. Hazard(s) identification

Hazards for the product as sold

Physical hazards	Flammable liquids	Category 2

Hazards for the product as sold

Health hazards	Acute toxicity, oral	Category 4
	Serious eye damage/eye irritation	Category 2
	Carcinogenicity	Category 2
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
	Specific target organ toxicity, single exposure	Category 3 narcotic effects

Hazards for the product as sold

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Highly flammable liquid and vapor. Harmful if swallowed. Causes serious eye irritation. May cause respiratory irritation. May cause drowsiness or dizziness. Suspected of causing cancer.

Precautionary statement

Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use non-sparking tools. Take action to prevent static discharges. Wash hands thoroughly after handling. Avoid breathing mist/vapors. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed or concerned: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. In case of fire: Use appropriate media to extinguish.
Storage	Keep cool. Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) May form explosive peroxides. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis. No additional hazards are known to be associated with the expected conditions of use at the time of publication. This document does not address hazards that may arise from uses not reasonably anticipated by the manufacturer.

Supplemental information None.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Tetrahydrofuran	THF	109-99-9	100

Additional components

Chemical name	Common name and synonyms	CAS number	%
Butylated hydroxytoluene		128-37-0	0.03

Composition comments All concentrations are in percent by weight.

4. First-aid measures

Inhalation Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. Call a poison center or doctor/physician if you feel unwell.

Skin contact Take off immediately all contaminated clothing. Rinse skin with water/shower. Get medical attention if irritation develops and persists.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.

Most important symptoms/effects, acute and delayed May cause drowsiness or dizziness. Headache. Nausea, vomiting. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Thermal burns: Flush with water immediately. While flushing, remove clothes which do not adhere to affected area. Call an ambulance. Continue flushing during transport to hospital. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information Take off all contaminated clothing immediately. IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media Water fog. Alcohol resistant foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical	Vapors may form explosive mixtures with air. Vapors may travel considerable distance to a source of ignition and flash back. During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	Highly flammable liquid and vapor. This product contains tetrahydrofuran that may form explosive organic peroxide when exposed to air or light or with age.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Wear appropriate protective equipment and clothing during clean-up. Avoid breathing mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Take precautionary measures against static discharge. Use only non-sparking tools. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water. Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Explosion-proof general and local exhaust ventilation. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Use non-sparking tools and explosion-proof equipment. Do not taste or swallow. Avoid breathing mist/vapors. Avoid contact with eyes. Avoid prolonged exposure. When using, do not eat, drink or smoke. Should be handled in closed systems, if possible. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Keep away from heat, sparks and open flame. Prevent electrostatic charge build-up by using common bonding and grounding techniques. Store in a cool, dry place out of direct sunlight. Store in tightly closed container. Store in a well-ventilated place. Keep in an area equipped with sprinklers. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Material	Type	Value
Tetrahydrofuran (CAS 109-99-9)	PEL	590 mg/m3
		200 ppm

US. ACGIH Threshold Limit Values (TLV)

Material	Type	Value
Tetrahydrofuran (CAS 109-99-9)	STEL	100 ppm

US. ACGIH Threshold Limit Values (TLV)

Material	Type	Value	
	TWA	50 ppm	
Additional components	**Type**	**Value**	**Form**
Butylated hydroxytoluene (CAS 128-37-0)	TWA	2 mg/m3	Inhalable fraction and vapor.

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Material	Type	Value
Tetrahydrofuran (CAS 109-99-9)	IDLH	2000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Material	Type	Value
Tetrahydrofuran (CAS 109-99-9)	STEL	735 mg/m3
		250 ppm
	TWA	590 mg/m3
		200 ppm
Additional components	**Type**	**Value**
Butylated hydroxytoluene (CAS 128-37-0)	TWA	10 mg/m3

Biological limit values

ACGIH Biological Exposure Indices (BEI)

Material	Value	Determinant	Specimen	Sampling Time
Tetrahydrofuran (CAS 109-99-9)	2 mg/l	Tetrahydrofuran	Urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US ACGIH Threshold Limit Values: Skin designation

Tetrahydrofuran (CAS 109-99-9) Danger of cutaneous absorption

Appropriate engineering controls Explosion-proof general and local exhaust ventilation. Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Provide eyewash station and safety shower.

Individual protection measures, such as personal protective equipment

Eye/face protection Chemical goggles are recommended.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Be aware that the liquid may penetrate the gloves. Frequent change is advisable. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear suitable protective clothing. Use of an impervious apron is recommended.

Respiratory protection In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134. Appropriate respirator selection should be made by a qualified professional.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. When using do not smoke. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Physical state Liquid.

Form	Liquid.
Color	Colorless, clear.
Odor	Ether-like.
Melting point/freezing point	-162.94 °F (-108.3 °C) / -163.3 °F (-108.5 °C)
Boiling point or initial boiling point and boiling range	150.8 °F (66 °C)
Flammability	Highly flammable liquid
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	1.8 %
Explosive limit - upper (%)	12 %(V) 11.8 %(V)
Flash point	-6.7 °F (-21.5 °C)
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
pH	Not available.
Kinematic viscosity	Not available.
Solubility	
Solubility (water)	Soluble.(10-99%)
Partition coefficient (n-octanol/water)	0.46
Vapor pressure	170 hPa
Vapor pressure temp.	68 °F (20 °C)
Density and/or relative density	
Density	Not available.
Relative density	Not available.
Vapor density	Not available.
Particle characteristics	Not available.
Other information	
Dynamic viscosity	0.46 mPa·s
Dynamic viscosity temp	77 °F (25 °C)
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	Oxidizes readily in air to form unstable peroxides that may explode spontaneously.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Prolonged contact with air may cause formation of explosive peroxides.
Conditions to avoid	Avoid heat, sparks, open flames and other ignition sources. Avoid temperatures exceeding the flash point. Contact with incompatible materials. Prolonged contact with air may cause formation of explosive peroxides.
Incompatible materials	Strong oxidizing agents. Air.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause drowsiness or dizziness. Headache. Nausea, vomiting. May cause irritation to the respiratory system. Prolonged inhalation may be harmful.
Skin contact	Prolonged skin contact may cause temporary irritation.

Eye contact Causes serious eye irritation.

Ingestion Harmful if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics May cause drowsiness or dizziness. Headache. Nausea, vomiting. Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Product	Species	Test Results
Tetrahydrofuran (CAS 109-99-9)		
Acute		
Inhalation		
LC50	Rat	53.9 mg/l, 4 Hours
Oral		
LD50	Rat	1650 mg/kg

Additional components	Species	Test Results
Butylated hydroxytoluene (CAS 128-37-0)		
Acute		
Dermal		
LD50	Rat	> 2000 mg/kg
Oral		
LD50	Rat	> 2930 mg/kg

Skin corrosion/irritation Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Suspected of causing cancer.

IARC Monographs. Overall Evaluation of Carcinogenicity

Butylated hydroxytoluene (CAS 128-37-0)	3 Not classifiable as to carcinogenicity to humans.
Tetrahydrofuran (CAS 109-99-9)	2B Possibly carcinogenic to humans.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation. May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Product		Species	Test Results
Tetrahydrofuran (CAS 109-99-9)			
Aquatic			
Acute			
Crustacea	LC50	Daphnia magna	5930 mg/l, 24 Hours
Fish	LC50	Pimephales promelas	2160 mg/l, 96 Hours
Chronic			
Algae	NOEC	Scenedesmus quadricauda	3700 mg/l, 8 days

Additional components		Species	Test Results
Butylated hydroxytoluene (CAS 128-37-0)			
Aquatic			
Chronic			
Crustacea	NOEC	Daphnia magna	0.07 mg/l, 21 days

Persistence and degradability No data is available on the degradability of this substance.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

Tetrahydrofuran (CAS 109-99-9)	0.46

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

US RCRA Hazardous Waste U List: Reference

Tetrahydrofuran (CAS 109-99-9)	U213

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN2056
UN proper shipping name Tetrahydrofuran (RQ = 1000 lbs)
Transport hazard class(es)
Class 3
Subsidiary hazard -
Label(s) 3
Packing group II
Environmental hazards
Marine pollutant No.
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions IB2, T4, TP1
Packaging exceptions 150
Packaging non bulk 202
Packaging bulk 242

IATA

UN number UN2056
UN proper shipping name Tetrahydrofuran

Transport hazard class(es)

Class	3
Subsidiary hazard	-
Packing group	II
Environmental hazards	No.
ERG Code	3H
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN2056
UN proper shipping name	TETRAHYDROFURAN
Transport hazard class(es)	
Class	3
Subsidiary hazard	-
Packing group	II
Environmental hazards	
Marine pollutant	No.
EmS	F-E, S-D
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to IMO instruments Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Toxic Substances Control Act (TSCA) This substance is on the TSCA 8(b) inventory and is designated “active”.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Tetrahydrofuran (CAS 109-99-9)

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes
Classified hazard categories	Flammable (gases, aerosols, liquids, or solids) Acute toxicity (any route of exposure) Serious eye damage or eye irritation Carcinogenicity Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Tetrahydrofuran (CAS 109-99-9)

US. Massachusetts RTK - Substance List

Butylated hydroxytoluene (CAS 128-37-0)
Tetrahydrofuran (CAS 109-99-9)

US. New Jersey Worker and Community Right-to-Know Act

Butylated hydroxytoluene (CAS 128-37-0)
Tetrahydrofuran (CAS 109-99-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Butylated hydroxytoluene (CAS 128-37-0)
Tetrahydrofuran (CAS 109-99-9)

US. Rhode Island RTK

Butylated hydroxytoluene (CAS 128-37-0)
Tetrahydrofuran (CAS 109-99-9)

California Proposition 65

WARNING: This product can expose you to Tetrahydrofuran, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

Tetrahydrofuran (CAS 109-99-9) Listed: December 17, 2021

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 17-July-2019

Revision date 02-January-2026

Version # 02

HMIS® ratings Health: 2*
Flammability: 3
Physical hazard: 0

Disclaimer This product is subject to Greenfield Global USA Inc.'s terms and conditions, which can be found at http://www.greenfield.com/tc-po-us/. Greenfield cannot anticipate all conditions under which this information and this product, or the products of other manufacturers in combination with this product, may be used. The user is responsible for the proper and safe use, handling, storage and disposal of the product, and assumes liability for any loss, injury, damage or expense arising from any failure to do so. The data in this sheet is based on information and experience available at the time of writing.