SAFETY DATA SHEET

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

1.1 Product identifiers

Product name	Tetrahydrofuran
CAS number	109-99-9
Synonyms	THF; Diethylene oxide; Furanidine

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

Identified uses	Laboratory Chemicals

1.3 Details of the supplier of the safety data sheet

Company	Lab Alley, LLC 12501 Pauls Valley Road Austin, Texas 78737 U.S.A.
Telephone	512-668-9918
Fax	512-886-4008

1.4 Emergency telephone

Emergency Phone #	US & Canada: 1-800-535-5053	INFOTRAC
	International 1-352-323-3500	INFOTRAC

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)
Acute Oral Toxicity (Category 4)
Serious Eye Damage/Eye Irritation (Category 2)
Carcinogenicity (Category 2)
Specific Target Organ Toxicity (single exposure) (Category 3)
Target Organ(s) - Respiratory system, Central nervous system (CNS)

2.2 GHS Label elements, including precautionary statements

Pictogram

Signal Word: Danger

Hazard statements:
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 statements:
Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Use personal protective equipment as required. Wash face, hands, and any exposed skin thoroughly after handling. Do not eat, drink, or smoke when using this product. Wear eye/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep cool.
Response: IF exposed or concerned, get medical attention/advice.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth.
Fire: In case of fire, use CO_2, dry chemical, or foam for extinction.
Storage: Store locked up. Store in a well-ventilated place. Keep container tightly closed.
Disposal: 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.
WARNING: Cancer.

SECTION 3: Composition/information on ingredients

3.1 Components

Chemical name	Common name and synonyms	CAS number	Concentration
Tetrahydrofuran	THF; Diethylene oxide; Furanidine	109-99-9	<=100%

SECTION 4: First aid measures

4.1 Description of first-aid measures

General advice

If inhaled Remove to fresh air. If not breathing, give artificial respiration. Get medical attention if symptoms occur.

In case of skin contact Wash off immediately with plenty of water for at least 15 minutes. If skin irritation persists, call a physician.

In case of eye contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention.

If swallowed Clean mouth with water and drink afterwards plenty of water.

4.2 Most important symptoms and effects, both acute and delayed

Difficulty in breathing. Symptoms of overexposure may be headache, dizziness, tiredness, nausea, and vomiting. Causes central nervous system depression.

4.3 Indication of any immediate medical attention and special treatment needed

If symptoms persist, call a physician. Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media Water spray, carbon dioxide (CO2), dry chemical, alcohol-resistant foam. Water mist maybe used to cool closed containers.

Unsuitable extinguishing media Water may be ineffective.

5.2 Specific hazards arising from the substance or mixture

Flammable. Containers may explode when heated. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. May form explosive peroxides. Hazardous Combustion Products: Carbon monoxide (CO). Carbon dioxide (CO2). Peroxides.

5.3 Special protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

5.4 Further information

Flash Point -14°C (6°F) - Closed Cup

Autoignition Temperature 321.0 °C (609.8 °F)

Explosion limits

Upper 11.8% (V)
Lower 2% (V)

Sensitivity to Mechanical Impact No information available.

Sensitivity to Static Discharge No information available.

NFPA

Health	Flammability	Instability	Physical hazards
2	3	1	N/A

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment as required. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

6.2 Environmental precautions

Should not be released into the environment.

6.3 Methods and materials for containment and cleaning up

Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. Remove all sources of ignition. Use spark-proof tools and explosion-proof equipment.

6.4 Reference to other sections

See Section 2 for full list of hazard and precaution statements.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapours/aerosols. Keep away from open flames, hot surfaces, and sources of ignition. Take precautionary measures against static discharge.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice.

7.2 Conditions for safe storage, including any incompatibilities

Storage conditions

Flammables area. Keep container tightly closed in a dry and well-ventilated place. Keep away from heat and sources of ignition. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Test for peroxide formation periodically and before distillation.

Incompatibilities

Strong oxidizing agents. Acids.

SECTION 8: Exposure controls/personal protection

8.1 Occupational exposure limits

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

Component	Type	Value
Tetrahydrofuran	(Vacated) TWA	200 ppm 590 mg/m3
	(Vacated) STEL	250 ppm 735 mg/m3
	TWA	200 ppm 590 mg/m3

US. ACGIH Threshold Limit Values

Component	Type	Value
Tetrahydrofuran	TWA	50 ppm
	STEL	100 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Component	Type	Value
Tetrahydrofuran	IDLH	2000 ppm
	TWA	200 ppm 590 mg/m3
	STEL	250 ppm 735 mg/m3

ACGIH Biological Exposure Indices

Component	Parameter,value	Biological specimen	Remarks
Tetrahydrofuran	Tetrahydrofuran	Urine	2 mg/L

8.2 Exposure controls

Appropriate engineering controls

Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Personal protective equipment

Eye/face protection

Use explosion-proof electrical/ventilating/lighting equipment. Ensure that eyewash stations and safety showers are close to the workstation location. Ensure adequate ventilation, especially in confined areas.

Skin protection

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Body Protection

Wear appropriate protective gloves and clothing to prevent skin exposure.

Respiratory protection

Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Recommended Filter type: Type A. Organic gases and vapours filter. Brown. Conforming to EN14387.

Control of environmental exposure

Do not let product enter drains. Risk of explosion.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical State	Liquid
Appearance	Colorless
Odor	No information available
Odor Threshold	No information available
pH	ca. 7 - 8
Melting Point/Range	-108.0 °C (-162.4 °F)
Boiling Point/Range	65.0 - 67.0 °C (149.0 - 152.6 °F)
Evaporation Rate	No information available
Flammability (solid)	Not applicable
Flammability or explosive limit	
Upper	11.8% (V)
Lower	2% (V)
Vapor Pressure	190.7 hPa (143.0 mmHg) at 20.0 °C (68.0 °F)
Vapor Density	2.1
Density	1.049 g/mL at 25 °C (77 °F)
Solubility	Soluble in water
Partition coefficient; n-octanol/water	log Pow: 0.45 at 25 °C (77 °F)
Autoignition Temp	321.0 °C (609.8 °F)

Decomposition Temp	No information available
Viscosity	No information available
Molecular Formula	C4H8O
Molecular Weight	72.11 g/mol
VOC Content(%)	No information available
Oxidizing properties	Not oxidizing

9.2 Other safety information No information available

SECTION 10: Stability and reactivity

10.1 Reactivity

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

10.2 Chemical stability

Stable under recommended storage conditions. Reacts with air to form peroxides. May form explosive peroxides on prolonged storage. Hygroscopic.

10.3 Possibility of hazardous reactions

None under normal processing.

10.4 Conditions to avoid

Incompatible products. Excess heat. Keep away from open flames, hot surfaces, and sources of ignition. Exposure to moist air or water.

10.5 Incompatible materials

Strong oxidizing agents, Acids.

10.6 Hazardous decomposition products

Carbon monoxide (CO), Carbon dioxide (CO2), peroxides.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Product Information, Component Information

Acute toxicity

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Tetrahydrofuran	1650 mg/kg (Rat)	> 2000 mg/kg (Rabbit)	180 mg/L (Rat) 1 h 53.9 mg/L (Rat) 4 h

Skin corrosion/irritation

No information available.

Serious eye damage/eye irritation

Irritating to eyes.

Respiratory or skin sensitization

May cause irritation of respiratory tract.

Germ cell mutagenicity

No information available.

Carcinogenicity

Component	CAS	IARC	NTP	ACGIH	OSHA	Mexico
Tetrahydrofuran	109-99-9	Group 2B	Not listed	A3	X	A3

Specific target organ toxicity - single exposure

Respiratory system, Central nervous system (CNS).

Specific target organ toxicity - repeated exposure

None known.

Reproductive toxicity

No information available.

Chronic effects

Symptoms of overexposure may be headache, dizziness, tiredness, nausea, and vomiting.
Causes central nervous system depression.

11.2 Additional Information

The toxicological properties have not been fully investigated.

SECTION 12: Ecological information

12.1 Toxicity

Do not empty into drains.

Product		Species	Test Results
Tetrahydrofuran	LC50	Pimephales promelas	2160 mg/L/96h
	LC50	Leuciscus idus	2820 mg/L/48h
	EC50	Water Flea	3485 mg/L/48h >10000 mg/L/24h

12.2 Persistence and degradability

Persistence is unlikely based on information available.

12.3 Bio accumulative potential

No information available.

12.4 Mobility in soil

Will likely be mobile in the environment due to its volatility.

12.5 Results of PBT and vPvB assessment

No information available.

12.6 Endocrine disrupting properties

Listed as a Group III Chemical on the EU Endocrine Disrupters Candidate List.

12.7 Other adverse effects

No information available.

SECTION 13: Disposal considerations

13.1 Waste Disposal Methods

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

Component	RCRA - U Series Wastes	RCRA - P Series Wastes
Tetrahydrofuran	U213	-

SECTION 14: Transport information

DOT (US)

UN Number	UN2056
Proper Shipping name	TETRAHYDROFURAN
Hazard Class	3
Packaging Group	II

IMDG

UN Number	UN2056
Proper Shipping name	TETRAHYDROFURAN
Hazard Class	3
Packaging Group	II

IATA

UN Number	UN2056
Proper Shipping name	TETRAHYDROFURAN
Hazard Class	3
Packaging Group	II

SECTION 15: Regulatory information

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

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
Not applicable.

CERCLA Hazardous Substance List (40 CFR 302.4)
Listed, Tetrahydrofuran (CAS #109-99-9), RQ: 1000 lb.

SARA 304 Emergency release notification
Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)
Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance
Not regulated.

SARA 311/312 Hazardous
See Section 2 for more information.

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
Not regulated.

FEMA Priority Substances Respiratory Health and Safety in the Flavor Manufacturing Workplace
Not listed.

US state regulations

US. Massachusetts RTK - Substance List
Listed, Tetrahydrofuran (CAS #109-99-9).

US. New Jersey Worker and Community Right-to-Know Act
Listed, Tetrahydrofuran (CAS #109-99-9).

US. Pennsylvania Worker and Community Right-to-Know Law
Listed, Tetrahydrofuran (CAS #109-99-9).

California Proposition 65
Listed, Tetrahydrofuran (CAS #109-99-9).

SECTION 16: Other information

Date of Issue: 05/20/2015
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SECTION 17: Disclaimer

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.