

# Material Safety Data Sheet

HAZARD WARNINGS			RISK PHRASES	PROTECTIVE CLOTHING
			<b>Flammable material; avoid heat and sources of ignition.</b> <b>Harmful compound, minimize exposure.</b> <b>Irritating to skin, eyes, and the respiratory system.</b> <b>CARCINOGEN. MINIMIZE EXPOSURE.</b> <b>May form explosive peroxides.</b>	   

## Section I. Chemical Product and Company Identification

Chemical Name	<b>Tetrahydrofuran Anhydrous</b> (stabilized with BHT)		
Catalog Number	T2394	Supplier	TCI America 9211 N. Harborside St. Portland OR 1-800-423-8616
Synonym	Not available.		
Chemical Formula	C <sub>4</sub> H <sub>8</sub> O		
CAS Number	109-99-9	In case of Emergency Call	<b>Chemtrec®</b> <b>(800) 424-9300 (U.S.)</b> <b>(703) 527-3887 (International)</b>

## Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Tetrahydrofuran Anhydrous (stabilized with BHT)	109-99-9	Min. 98.0 (GC)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.	Rat LD <sub>50</sub> (oral) 1650 mg/kg Guinea Pig LD <sub>50</sub> (oral) 2300 mg/kg Rat LD <sub>50</sub> (inhalation) 21000 ppm/3H Rat LD <sub>50</sub> (intraperitoneal) 2900 mg/kg Mouse LD <sub>50</sub> (intraperitoneal) 1900 mg/kg

## Section III. Hazards Identification

Acute Health Effects	Harmful if ingested or inhaled. Minimize exposure to this material. Severe overexposure can result in injury or death. Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.
Chronic Health Effects	<b>CARCINOGENIC EFFECTS</b> : Carcinogenic by RTECS criteria <b>MUTAGENIC EFFECTS</b> : Not available. <b>TERATOGENIC EFFECTS</b> : Tumorigenic Effects. Mouse TCLo Inhalation 113400 mg/kg/105 weeks intermittent <b>TOXIC Effects:</b> Tumorigenic - Carcinogenic by RTECS criteria. Liver - Tumors Mouse TCLo Inhalation 1800 ppm/6 hours/2 years intermittent <b>TOXIC Effects:</b> Tumorigenic - Carcinogenic by RTECS criteria Liver - Tumors Rat TCLo Inhalation 1800 ppm/6 hours/2 years intermittent <b>TOXIC Effects:</b> Tumorigenic - Equivocal tumorigenic agent by RTECS criteria Kidney, Ureter, and Bladder - Tumors <b>DEVELOPMENTAL TOXICITY</b> Reproductive effects. Rat TDLo Oral 1.125 mg/kg, female multigeneration <b>TOXIC Effects:</b> Effects on Newborn - Behavioral Effects on Newborn - Physical Effects on Newborn - Delayed effects Mouse TDLo Oral 2592 mg/kg, female 6-17 days of pregnancy <b>TOXIC Effects:</b> Effects on Fertility - Litter size Effects on Embryo or Fetus - Fetotoxicity Mouse TDLo Oral 2592 mg/kg, female 6-17 days of pregnancy <b>TOXIC Effects:</b> Effects on Embryo or Fetus - Other effects to embryo Specific Developmental Abnormalities - Musculoskeletal system

**Section IV. First Aid Measures**

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Inhalation	If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.
Ingestion	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive.

**Section V. Fire and Explosion Data**

Flammability	Flammable.	Auto-Ignition	321°C (609.8°F)
Flash Points	-17°C (1.4°F).	Flammable Limits	LOWER: 1.8% UPPER: 11.8%
Combustion Products	These products are toxic carbon oxides (CO, CO <sub>2</sub> ).		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	Flammable liquid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Consult with local fire authorities before attempting large scale fire-fighting operations.		

**Section VI. Accidental Release Measures**

Spill Cleanup Instructions	Flammable material. Harmful material. Irritating material. Carcinogenic material. Keep away from heat. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Consult federal, state, and/or local authorities for assistance on disposal.
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**Section VII. Handling and Storage**

Handling and Storage Information	FLAMMABLE. HARMFUL. IRRITANT. CARCINOGEN. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. Do not breathe gas/fumes/ vapor/spray. Always store away from incompatible compounds such as oxidizing agents.
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**Section VIII. Exposure Controls/Personal Protection**

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.
Personal Protection	Splash goggles. Lab coat. Vapor respirator. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. Be sure to use a MSHA/NIOSH approved respirator or equivalent.
	
Exposure Limits	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen.

**Section IX. Physical and Chemical Properties**

Physical state @ 20°C	Liquid. (Clear, colorless.)	Solubility	Miscible with water.
Specific Gravity	0.889 (water=1)		
Molecular Weight	72.11	Partition Coefficient	Log P <sub>ow</sub> : 0.47
Boiling Point	65 to 67°C (149 to 152.6°F)	Vapor Pressure	19.3 kPa (@ 20°C)
Melting Point	-108°C (-162.4°F)	Vapor Density	2.5 (Air = 1)
Refractive Index	1.4050 - 1.4090	Volatility	Not available.
Critical Temperature	Not available.	Odor	Characteristic.
Viscosity	Not available.	Taste	Not available.

**Section X. Stability and Reactivity Data**

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Reactive with oxidizing agents, Oxygen.

**Section XI. Toxicological Information**

RTECS Number	LU5950000
Routes of Exposure	Eye Contact. Ingestion. Inhalation.
Toxicity Data	Rat LD <sub>50</sub> (oral) 1650 mg/kg Guinea Pig LD <sub>50</sub> (oral) 2300 mg/kg Rat LD <sub>50</sub> (inhalation) 21000 ppm/3H Rat LD <sub>50</sub> (intraperitoneal) 2900 mg/kg Mouse LD <sub>50</sub> (intraperitoneal) 1900 mg/kg
Chronic Toxic Effects	<b>CARCINOGENIC EFFECTS</b> : Carcinogenic by RTECS criteria <b>MUTAGENIC EFFECTS</b> : Not available. <b>TERATOGENIC EFFECTS</b> : Tumorigenic Effects. Mouse TCl <sub>o</sub> Inhalation 113400 mg/kg/105 weeks intermittent TOXIC Effects: Tumorigenic - Carcinogenic by RTECS criteria. Liver - Tumors Mouse TCl <sub>o</sub> Inhalation 1800 ppm/6 hours/2 years intermittent TOXIC Effects: Tumorigenic - Carcinogenic by RTECS criteria Liver - Tumors Rat TCl <sub>o</sub> Inhalation 1800 ppm/6 hours/2 years intermittent TOXIC Effects: Tumorigenic - Equivocal tumorigenic agent by RTECS criteria Kidney, Ureter, and Bladder - Tumors <b>DEVELOPMENTAL TOXICITY</b> Reproductive effects. Rat TDLo Oral 1.125 mg/kg, female multigeneration TOXIC Effects: Effects on Newborn - Behavioral Effects on Newborn - Physical Effects on Newborn - Delayed effects Mouse TDLo Oral 2592 mg/kg, female 6-17 days of pregnancy TOXIC Effects: Effects on Fertility - Litter size Effects on Embryo or Fetus - Fetotoxicity Mouse TDLo Oral 2592 mg/kg, female 6-17 days of pregnancy TOXIC Effects: Effects on Embryo or Fetus - Other effects to embryo Specific Developmental Abnormalities - Musculoskeletal system
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**Section XII. Ecological Information**

Ecotoxicity	Not available.
Environmental Fate	Tetrahydrofuran's production and use as a solvent for natural and synthetic resins and in organic synthesis may result in its release to the environment through various waste streams. If released to air, a vapor pressure of 162 mm Hg at 25 deg C indicates tetrahydrofuran will exist solely as a vapor in the ambient atmosphere. Vapor-phase tetrahydrofuran will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl and nitrate radicals; the half-life for these reactions in air are about 1 and 3 days, respectively. If released to soil, tetrahydrofuran is expected to have very high mobility based upon Koc values of 23 and 18. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 7.1X10 <sup>-5</sup> atm-cu m/mole. Tetrahydrofuran may volatilize from dry soil surfaces based upon its vapor pressure. Tetrahydrofuran added to surface soil had an abiotic half-life of 5.7 days. If released into water, tetrahydrofuran is not expected to adsorb to suspended solids and sediment based upon the Koc. Tetrahydrofuran is expected to biodegrade under aerobic conditions but may be resistant to biodegradation in anaerobic environments. In the modified MITI screening test, tetrahydrofuran at 30 mg/l was completely biodegraded in 14 days using an activated sludge inoculum. Tetrahydrofuran at 50 mg C/l was resistant to anaerobic biodegradation with a lag period of greater than 60 days using a primary digesting sludge as an inoculum. Volatilization from water surfaces is expected to be an important fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 13.1 hrs and 6.6 days, respectively. An estimated BCF of 3 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to occur due to the lack of hydrolyzable functional groups. Occupational exposure to tetrahydrofuran may occur through inhalation and dermal contact with this compound at workplaces where tetrahydrofuran is produced or used.

**Section XIII. Disposal Considerations**

Waste Disposal	Recycle to process, if possible. Consult your local regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and local regulations when disposing of the substance.
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**Section XIV. Transport Information**

DOT Classification	DOT Class 3: Flammable liquid
PIN Number	UN2056
Proper Shipping Name	Tetrahydrofuran
Packing Group (PG)	II
DOT Pictograms	

**Section XV. Other Regulatory Information and Pictograms**

TSCA Chemical Inventory (EPA)	This compound is <b>ON</b> the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC). On DSL
EINECS Number (EEC)	203-726-8
EEC Risk Statements	R10- Flammable. R18- In use, may form flammable/explosive vapor-air mixture. R20/21/22- Harmful by inhalation, in contact with skin and if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. R45- May cause cancer. R46- May cause heritable genetic damage. R47- May cause birth defects.
Japanese Regulatory Data	ENCS No. 5-53; 5-3335

**Section XVI. Other Information**

**Version 1.0**  
**Validated on 5/30/2008.**  
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**Notice to Reader**

TCl laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.