

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
 	Flammable material; avoid heat and sources of ignition. Harmful compound, minimize exposure. Hygroscopic -- keep container tightly sealed. Moisture sensitive material. POSSIBLE CARCINOGEN. MINIMIZE EXPOSURE. Store under nitrogen.	   

Section I. Chemical Product and Company Identification

Chemical Name	Ethyl Formate		
Catalog Number	F0053	Supplier	TCI America 9211 N. Harborside St. Portland OR 1-800-423-8616
Synonym	Formic Acid Ethyl Ester		
Chemical Formula	C ₃ H ₆ O ₂		
CAS Number	109-94-4	In case of Emergency Call	Chemtrec® (800) 424-9300 (U.S.) (703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Ethyl Formate	109-94-4	Min 98.0% (GC)	This chemical is classified as a possible carcinogen. There is no acceptable exposure limit for a carcinogen.	Rat LD ₅₀ (oral) 1850 mg/kg Rabbit LD ₅₀ (dermal) 20 ml/kg Rat LC ₅₀ (inhalation) 8000 mg/m ³ /4H

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. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.
Chronic Health Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : TUMORIGENIC EFFECTS Mouse TDLo-ROUTE: Skin; Dose: 110 gm/ kg/ 9W intermittent. TOXIC EFFECTS: Tumorigenic- Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages- Tumors. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

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	440 °C (824 °F)
Flash Points	-20 °C (-4 °F).	Flammable Limits	LOWER: 2.7% UPPER: 16.5%
Combustion Products	These products are toxic carbon oxides (CO, CO ₂).		
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.		

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Emergency phone number (800) 424-9300

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 MeasuresSpill Cleanup
Instructions

Flammable material. Harmful material. Hygroscopic material. Moisture sensitive material. Possible 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.

Section VII. Handling and StorageHandling and Storage
Information

FLAMMABLE. HARMFUL.. HYGROSCOPIC. MOISTURE SENSITIVE. POSSIBLE 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, acids, alkalis (bases), moisture.

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 possible carcinogen. There is no acceptable exposure limit for a carcinogen.

Section IX. Physical and Chemical Properties

Physical state @ 20°C

Liquid. (Clear, colorless.)

Solubility

Soluble in water, and other organic solutions.
Miscible in Ethanol Ether Benzene Acetone.

Specific Gravity

0.92 (water=1)

Molecular Weight

74.08

Partition Coefficient

Log P_{ow} 0.23

Boiling Point

54 °C (129.2 °F)

Vapor Pressure

25.6 kPa @ 20 °C

Melting Point

-80 °C (-112 °F)

Vapor Density

2.55 (Air = 1)

Refractive Index

1.359 to 1.363

Volatility

Not available.

Critical Temperature

Not available.

Odor

Fruity.

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

Moisture sensitive. Avoid excessive heat and light.

Incompatibilities

Reactive with strong oxidizing agents, acids, alkalis (bases), moisture, nitrates.

Section XI. Toxicological Information

RTECS Number

LQ8400000

Routes of Exposure

Eye Contact. Ingestion. Inhalation.

Toxicity Data

Rat LD₅₀ (oral) 1850 mg/kg
Rabbit LD₅₀ (dermal) 20 ml/kg
Rat LC₅₀ (inhalation) 8000 mg/m³/4H

Chronic Toxic Effects

CARCINOGENIC EFFECTS : Not available.
MUTAGENIC EFFECTS : Not available.
TERATOGENIC EFFECTS : TUMORIGENIC EFFECTS
Mouse TDLo-ROUTE: Skin; Dose: 110 gm/ kg/ 9W intermittent.
TOXIC EFFECTS:
Tumorigenic- Equivocal tumorigenic agent by RTECS criteria.
Skin and Appendages- Tumors.
DEVELOPMENTAL TOXICITY: Not available.
Repeated or prolonged exposure to this compound is not known to aggravate existing medical conditions.

Acute Toxic Effects

Harmful if ingested or inhaled. Minimize exposure to this material. Severe overexposure can result in injury or death. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Release of ethyl formate to the environment will result from its manufacture, transport, disposal, and use in synthetic flavors for lemonades, essences, artificial rum and arrac; and as a fungicide and larvicide for tobacco, cereals, dried fruit, and other crops. It also occurs naturally in fruit and other natural products. It is also used as a solvent for cellulose nitrate and acetate, as an acetone substitute, fumigant, and in organic synthesis. If released to soil, it would be expected to volatilize from the soil surface and readily leach. It would be expected to readily biodegrade and chemically hydrolyze, especially in alkaline soil. Ethyl formate has a relatively high Henry's Law constant and therefore, will readily volatilize. A volatilization half-life of 4.5 hrs was predicted for ethyl formate from a model river. It would not be expected to sorb to sediment or bioconcentrate in aquatic organisms. Hydrolysis will be an important fate process, especially in alkaline waters (half-life is 3.1 days and 7.5 hr at pH 7 and 8, respectively). Based on limited data from screening tests supplemented by predictions of mathematical models and data on similar chemicals, ethyl formate will rapidly biodegrade. In the atmosphere, ethyl formate will react with photochemically-produced hydroxyl radicals, with an estimated half-life of 11 days. It is fairly soluble in water and should be readily washed out of the air by rain. Exposure will occur as a result of ingestion of foods containing ethyl formate and occupationally via inhalation and dermal contact. (SRC) [Peer Reviewed]

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	UN1190
Proper Shipping Name	Ethyl Formate
Packing Group (PG)	II
DOT Pictograms	

Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is ON the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	On DSL.
EINECS Number (EEC)	203-721-0
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. R45- May cause cancer.
Japanese Regulatory Data	ENCS No. (2) -678

Section XVI. Other Information

Version 1.0
Validated on 7/18/2006.
Printed 7/18/2006.

Notice to Reader

TCI 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.