

Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	<p>Flammable material; avoid heat and sources of ignition.</p> <p>Toxic compound, do not ingest or inhale. Avoid all contact with this material.</p> <p>Corrosive to eyes and skin on contact.</p> <p>This compound is a skin sensitizer.</p> <p>Aspiration Hazard; may be fatal if swallowed and enters airways.</p> <p>Reproductive effects; may damage fertility or the unborn child.</p> <p>Moisture sensitive material.</p> <p>Heat sensitive material.</p> <p>Lachrymatory.</p> <p>Store under argon.</p> <p>May develop pressure.</p> <p>Refrigerate.</p>	

Section I. Chemical Product and Company Identification

Chemical Name	Isopropyl Chloroformate (ca. 30% in Toluene, ca. 2mol/L)		
Catalog Number	I0768	Supplier	TCI America 9211 N. Harbortgate St. Portland OR 1-800-423-8616
Synonym	Carbonochloridic acid, 1-methylethyl ester (CA INDEX NAME); Chloroformic Acid Isopropyl Ester		
Chemical Formula	C ₄ H ₇ ClO ₂		
CAS Number	108-23-6 108-88-3 (Toluene)	<div style="border: 2px dashed black; padding: 5px;"> In case of Emergency Call Chemtrec® (800) 424-9300 (U.S.) (703) 527-3887 (International) </div>	

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Isopropyl Chloroformate (ca. 30% in Toluene, ca. 2mol/L)	108-23-6 108-88-3 (Toluene)	ca. 30% ca. 70% (Toluene)	Not available.	Rat LD ₅₀ (oral) 1070 mg/kg Mouse LD ₅₀ (oral) 178 mg/kg Mouse LD ₅₀ (dermal) 12 mg/kg Rabbit LD ₅₀ (dermal) 11300 mg/kg (Toluene) Rat LD ₅₀ (oral) 636 mg/kg Rabbit LD ₅₀ (dermal) 14100 uL/kg Rat LC ₅₀ (inhalation) 49 gm/m ³ /4H

Section III. Hazards Identification

Acute Health Effects	<p>Corrosive to skin, eyes, and respiratory system. Liquid or spray mist may produce tissue damage, particularly in mucous membranes of the eyes, mouth and respiratory tract. Skin contact may produce burns. Eye contact can result in corneal damage or blindness. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Corrosive materials may cause serious injury if ingested.</p> <p>Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death.</p> <p>Aspiration Hazard; may be fatal if swallowed and enters airways.</p> <p>Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material.</p> <p>Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.</p>
Chronic Health Effects	<p>CARCINOGENIC EFFECTS : Not available.</p> <p>MUTAGENIC EFFECTS : Not available.</p> <p>TERATOGENIC EFFECTS : Not available.</p> <p>DEVELOPMENTAL TOXICITY: Reproductive Effects. (Toluene) Rat TCLo Inhalation 800 mg/m³/6 hours, female 14-20 days of pregnancy TOXIC Effects: Effects on Embryo or Fetus - Fetotoxicity Effects on Newborn - Behavioral Mouse TCLo Inhalation 400 ppm/7 hours, female 7-16 days of pregnancy TOXIC Effects: Specific Developmental Abnormalities - Musculoskeletal system Effects on Newborn - Biochemical and metabolic Mouse TDLo Oral 9 gm/kg, female 6-15 days of pregnancy TOXIC Effects: Effects on Embryo or Fetus - Fetal death</p> <p>Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.</p>

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 for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
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	DO NOT INDUCE VOMITING. 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	535 °C (995 °F) (Toluene)
Flash Points	6 °C (42.8 °F). 4 °C (39.2 °F). (Toluene)	Flammable Limits	LOWER: 4% UPPER: 15% LOWER: 1.2% UPPER: 7% (Toluene)
Combustion Products	These products are toxic carbon oxides (CO, CO ₂), halogenated compounds. WARNING: Highly toxic HCl gas is produced during combustion.		
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. Toxic material. Corrosive material. Skin sensitizing material. Aspiration hazard. Reproductive effecting material. Moisture sensitive material. Heat sensitive material. Lachrymatory 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 get water inside container. DO NOT touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. 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. TOXIC. CORROSIVE. SKIN SENSITIZER. ASPIRATION HAZARD. REPRODUCTIVE EFFECTOR. MOISTURE SENSITIVE. HEAT SENSITIVE. LACHRYMATOR. STORE UNDER ARGON. MAY DEVELOP PRESSURE. REFRIGERATE. Keep locked up. Keep container dry. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. DO NOT ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Always store away from incompatible compounds such as oxidizing agents, alkalis (bases), moisture.
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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	Face shield. Lab coat. Vapor respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. 
Exposure Limits	Not available.

Section IX. Physical and Chemical Properties

Physical state @ 20 °C	Liquid. (Clear, colorless.)	Solubility	Not available.
Specific Gravity	0.892 0.865 (Toluene)		
Molecular Weight	C ₃ H ₇ ClO ₂ =122.55 C ₇ H ₈ =92.14 (Toluene)	Partition Coefficient	Log K _{ow} : 2.73 (Toluene)
Boiling Point	101 to 102 °C (213.8 to 215.6 °F) 110.6 °C (231.08 °F) (Toluene)	Vapor Pressure	28 hPa (@ 20 °C) 28.4 mmHg (@ 25 °C) (Toluene)
Melting Point	-93 °C (-135.4 °F) (Toluene)	Vapor Density	3.1 (Air = 1) (Toluene)
Refractive Index	Not available.	Volatility	Not available.
Critical Temperature	Not available.	Odor	Not available.
Viscosity	0.778 cP (@ 0 °C)	Taste	Not available.

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Emergency phone number (800) 424-9300

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. Moisture sensitive.
Incompatibilities	Reactive with strong oxidizing agents, strong alkalis (bases), moisture.

Section XI. Toxicological Information

RTECS Number	LQ6475000 XS5250000 (Toluene)
Routes of Exposure	Eye Contact. Ingestion. Inhalation. Skin contact.
Toxicity Data	Rat LD ₅₀ (oral) 1070 mg/kg Mouse LD ₅₀ (oral) 178 mg/kg Mouse LD ₅₀ (dermal) 12 mg/kg Rabbit LD ₅₀ (dermal) 11300 mg/kg (Toluene) Rat LD ₅₀ (oral) 636 mg/kg Rabbit LD ₅₀ (dermal) 14100 uL/kg Rat LC ₅₀ (inhalation) 49 gm/m ³ /4H
Chronic Toxic Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Not available. DEVELOPMENTAL TOXICITY : Reproductive Effects. (Toluene) Rat TClO Inhalation 800 mg/m ³ /6 hours, female 14-20 days of pregnancy TOXIC Effects : Effects on Embryo or Fetus - Fetotoxicity Effects on Newborn - Behavioral Mouse TClO Inhalation 400 ppm/7 hours, female 7-16 days of pregnancy TOXIC Effects : Specific Developmental Abnormalities - Musculoskeletal system Effects on Newborn - Biochemical and metabolic Mouse TDLo Oral 9 gm/kg, female 6-15 days of pregnancy TOXIC Effects : Effects on Embryo or Fetus - Fetal death Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	Corrosive to skin, eyes, and respiratory system. Liquid or spray mist may produce tissue damage, particularly in mucous membranes of the eyes, mouth and respiratory tract. Skin contact may produce burns. Eye contact can result in corneal damage or blindness. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Corrosive materials may cause serious injury if ingested. Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Aspiration Hazard; may be fatal if swallowed and enters airways. Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Isopropyl chloroformate's use as a chemical intermediate could release the compound to the environment through various waste streams generated at sites of production and use. If released to the atmosphere, it will degrade in the vapor phase by reaction with photochemically produced hydroxyl radicals (estimated half-life of about 5 days). Since isopropyl chloroformate hydrolyzes readily in water, atmospheric degradation may occur through dissolution into clouds or through contact with rain or other atmospheric water. If released to water or moist soil, hydrolysis will be the dominant degradation process; the aqueous hydrolysis half-life is 5.6 min at 24.5 deg C. If released to dry surfaces, isopropyl chloroformate will evaporate into the atmosphere. Occupational exposure can occur through inhalation. (Toluene) Toluene is released into the atmosphere principally from the volatilization of petroleum fuels and toluene-based solvents and thinners and from motor vehicle exhaust. Toluene's production and use as an intermediate in the production of benzoic acid, benzaldehyde, benzene, explosives, dyes and many other organic compounds may also result in its release to the environment through various waste streams. Toluene has been detected in emissions from volcanos, forest fires and crude oil. If released to air, a vapor pressure of 28.4 mm Hg at 25 deg C indicates toluene will exist solely as a vapor in the ambient atmosphere. Vapor-phase toluene will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 3 days. Toluene may also be degraded in the atmosphere by reaction with nitrate radicals and ozone molecules, but these reactions are too slow to be environmentally important. If released to soil, toluene is expected to have high to moderate mobility based upon Koc values in the range of 37-178. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 6.64X10 ⁻³ atm-cu m/mole. Toluene may volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation is expected to occur rapidly in soil surfaces, with half-lives in the range of several hours to 71 days. If released into water, toluene is not expected to adsorb to suspended solids and sediment based upon a Koc of 166 measured in lake sediment. Biodegradation is expected to occur rapidly in water, with reported half-lives of 4 and 56 days in aerobic and anaerobic water, respectively. 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 1 hour and 4 days, respectively. Measured BCF values of 13 and 90 in fish suggest bioconcentration in aquatic organisms is low to moderate. Hydrolysis is not expected to be an important environmental fate process for toluene due to lack of hydrolyzable functional groups. Exposure to toluene may occur occupationally during its production or subsequent use, particularly as a solvent or in gasoline, via dermal and respiratory routes. The main route of exposure for the general population will be through inhalation from contaminated air and handling of gasoline as well as ingestion of contaminated drinking water and food, and exposure to some consumer products.

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Emergency phone number (800) 424-9300

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.

Section XIV. Transport Information

DOT Classification DOT Class 3: Flammable liquid
DOT Class 6.1: Toxic material
DOT Class 8: Corrosive material

PIN Number UN3286

Proper Shipping Name Flammable liquid, toxic, corrosive, n.o.s.

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) CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS E: Corrosive liquid.
On NDSL.
On DSL. (Toluene)

EINECS Number (EEC) 203-563-2
203-265-9 (Toluene)

EEC Risk Statements R10- Flammable.
R18- In use, may form flammable/explosive vapor-air mixture.
R23/24/25- Toxic by inhalation, in contact with skin and if swallowed.
R34- Causes burns.
R43- May cause sensitization by skin contact.
R47- May cause birth defects.

Japanese Regulatory Data ENCS No. 2-1144; 2-1704
ENCS No. 3-2 (Toluene)

Section XVI. Other Information

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Validated on 10/27/2010.
Printed 10/27/2010.

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.