

# Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
  	<p>Highly toxic; do not ingest or inhale.                      Corrosive to eyes and skin on contact.                      Lachrymator.  <b>CARCINOGEN. MINIMIZE EXPOSURE.</b>  <b>MUTAGEN. MINIMIZE EXPOSURE.</b>                      Reacts violently with water.                      Handle and store under inert gas.                      Refrigerate and vent pressure slowly before opening.</p>	   

## Section I. Chemical Product and Company Identification

Chemical Name	<b>Titanium(IV) Chloride</b> (14% in Dichloromethane, ca. 1.0mol/L)		
Catalog Number	T2052	Supplier	TCI America 9211 N. Harborsgate St. Portland OR 1-800-423-8616
Synonym	Titanium Tetrachloride		
Chemical Formula	Cl <sub>4</sub> Ti CH <sub>2</sub> Cl <sub>2</sub> (Dichloromethane)		
CAS Number	7550-45-0 75-09-2 (Dichloromethane)	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
Titanium(IV) Chloride (14% in Dichloromethane, ca. 1.0mol/L)	7550-45-0 75-09-2 (Dichloromethane)	ca. 14.0 ca. 86.0	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen. This compound is classified as a mutagen. There is no acceptable exposure limit for a mutagen.	Rabbit LD <sub>50</sub> (dermal) 3160 mg/kg Rat LD <sub>50</sub> (inhalation) 400 mg/m <sup>3</sup> Mouse LD <sub>50</sub> (inhalation) 100/m <sup>3</sup> /2H (Dichloromethane) Rat LD <sub>50</sub> (oral) 1600 mg/kg Mouse LD <sub>50</sub> (oral) 873 mg/kg Rat LD <sub>50</sub> (intraperitoneal) 916 mg/kg

## Section III. Hazards Identification

Acute Health Effects	<p>Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. 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. Readily absorbed through skin. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.</p>
Chronic Health Effects	<p><b>CARCINOGENIC EFFECTS</b> : Carcinogenic by RTECS criteria.  <b>MUTAGENIC EFFECTS</b> : Not available.  <b>TERATOGENIC EFFECTS</b> : Tumorigenic effects. (Dichloromethane)                      Rat TClO Inhalation 3500 ppm/6 hours for 2 years intermittent  <b>TOXIC EFFECTS:</b>                      Tumorigenic - Carcinogenic by RTECS criteria                      Mouse TClO Inhalation 122400 mg/kg for 102 weeks intermittent  <b>TOXIC EFFECTS:</b>                      Tumorigenic - Carcinogenic by RTECS criteria                      Mouse TClO Inhalation 2000 ppm/5 hours for 2 years continuous  <b>TOXIC EFFECTS:</b>                      Tumorigenic - Carcinogenic by RTECS criteria                      Lung, Thorax, or Respiration - Tumors  <b>DEVELOPMENTAL TOXICITY:</b> Reproductive effects. (Dichloromethane)                      Rat TClO Inhalation 1250 ppm for 7 hours, female 6-15 days of pregnancy  <b>TOXIC EFFECTS:</b>                      Specific Developmental Abnormalities - Musculoskeletal system                      Specific Developmental Abnormalities - Urogenital system                      Mouse TClO Inhalation 1250 ppm for 7 hours, female 6-15 days of pregnancy  <b>TOXIC EFFECTS:</b>                      Specific Developmental Abnormalities - Musculoskeletal system                      Rat TClO Inhalation 4500 ppm for 24 hours, female 1-17 days of pregnancy  <b>TOXIC EFFECTS:</b>                      Effects on Newborn - Behavioral                      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	May be combustible at high temperature.	Auto-Ignition	556 °C (1032.8 °F) (Dichloromethane)
Flash Points	100 °C (212 °F) (Dichloromethane)	Flammable Limits	LOWER: 12% UPPER: 25% (Dichloromethane)
Combustion Products	These products include toxic carbon oxides (CO, CO <sub>2</sub> ), halogenated compounds, metallic oxides. 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	SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet. Consult with local fire authorities before attempting large scale fire-fighting operations.		

**Section VI. Accidental Release Measures**

Spill Cleanup Instructions	Highly toxic material. Corrosive material. Lachrymatory material. Carcinogenic material. Mutagenic material. This material reacts violently with water. 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. Eliminate all sources of ignition. Consult federal, state, and/or local authorities for assistance on disposal.
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**Section VII. Handling and Storage**

Handling and Storage Information	HIGHLY TOXIC. CORROSIVE. LACHRYMATORY. CARCINOGEN. MUTAGEN. REACTS VIOLENTLY WITH WATER. HANDLE AND STORE UNDER INERT GAS. REFRIGERATE AND VENT PRESSURE SLOWLY BEFORE OPENING. Keep locked up. Keep container dry. Keep away from heat. Mechanical exhaust required. When not in use, tightly seal the container and store in a dry, cool place. 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, metals, 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	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen. This compound is classified as a mutagen. There is no acceptable exposure limit for a mutagen.

**Section IX. Physical and Chemical Properties**

Physical state @ 20°C	Liquid. (Clear, colorless ~ yellow.)	Solubility	Not available.
Specific Gravity	1.37 (water=1)		
Molecular Weight	Cl <sub>4</sub> Ti = 189.68 CH <sub>2</sub> Cl <sub>2</sub> = 84.93 (Dichloromethane)	Partition Coefficient	LOG P <sub>ow</sub> : 1.25 (Dichloromethane)
Boiling Point	136 °C (276.8 °F) 39 °C (°F) (Dichloromethane)	Vapor Pressure	1.3 kPa (@ 21 °C) 47.4 kPa (@ 24 °C) (Dichloromethane)
Melting Point	-24.1 °C (-11.4 °F) -97 °C (°C) (Dichloromethane)	Vapor Density	6.5 (Air = 1) 2.9 (Air = 1) (Dichloromethane)
Refractive Index	1.424 (Dichloromethane)	Volatility	Not available.
Critical Temperature	Not available.	Odor	Characteristic.
Viscosity	<0.001 Pas (@ 20 °C)	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. Reacts violently with water. Refrigerate and vent pressure slowly before opening. Handle and store under inert gas.
Incompatibilities	Reactive with oxidizing agents, metals, alkalis (bases), moisture. Decomposes violently in contact with water. Reacts violently with light metals, strong oxidizing agents, strong bases. Damages a variety of metals in the presence of water. Will attack some forms of plastics, rubber, and coatings.

**Section XI. Toxicological Information**

RTECS Number	XR1925000 PA8050000 (Dichloromethane)
Routes of Exposure	Eye Contact. Ingestion. Inhalation. Skin contact.
Toxicity Data	Rabbit LD <sub>50</sub> (dermal) 3160 mg/kg Rat LD <sub>50</sub> (inhalation) 400 mg/m <sup>3</sup> Mouse LD <sub>50</sub> (inhalation) 100/m <sup>3</sup> /2H (Dichloromethane) Rat LD <sub>50</sub> (oral) 1600 mg/kg Mouse LD <sub>50</sub> (oral) 873 mg/kg Rat LD <sub>50</sub> (intraperitoneal) 916 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. (Dichloromethane) Rat TClO Inhalation 3500 ppm/6 hours for 2 years intermittent <b>TOXIC EFFECTS:</b> Tumorigenic - Carcinogenic by RTECS criteria Mouse TClO Inhalation 122400 mg/kg for 102 weeks intermittent <b>TOXIC EFFECTS:</b> Tumorigenic - Carcinogenic by RTECS criteria Mouse TClO Inhalation 2000 ppm/5 hours for 2 years continuous <b>TOXIC EFFECTS:</b> Tumorigenic - Carcinogenic by RTECS criteria Lung, Thorax, or Respiration - Tumors <b>DEVELOPMENTAL TOXICITY:</b> Reproductive effects. (Dichloromethane) Rat TClO Inhalation 1250 ppm for 7 hours, female 6-15 days of pregnancy <b>TOXIC EFFECTS:</b> Specific Developmental Abnormalities - Musculoskeletal system Specific Developmental Abnormalities - Urogenital system Mouse TClO Inhalation 1250 ppm for 7 hours, female 6-15 days of pregnancy <b>TOXIC EFFECTS:</b> Specific Developmental Abnormalities - Musculoskeletal system Rat TClO Inhalation 4500 ppm for 24 hours, female 1-17 days of pregnancy <b>TOXIC EFFECTS:</b> Effects on Newborn - Behavioral 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	Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. 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. Readily absorbed through skin. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.

**Section XII. Ecological Information**

Ecotoxicity	Not available.
Environmental Fate	(Dichloromethane) Dichloromethane's production and use as solvent, chemical intermediate, grain fumigant, paint stripper and remover, metal degreaser, and refrigerant may result in its release to the environment through various waste streams. If released to air, a vapor pressure of 435 mm Hg at 25 deg C indicates dichloromethane will exist solely as a vapor in the ambient atmosphere. Vapor-phase dichloromethane 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 119 days. It will not be subject to direct photolysis. If released to soil, dichloromethane is expected to have very high mobility based upon an estimated Koc of 24. Volatilization from moist soil surfaces is expected to be an important fate process based upon an estimated Henry's Law constant of 3.25X10 <sup>-3</sup> atm-cu m/mole. Dichloromethane may volatilize from dry soil surfaces based upon its vapor pressure. Biodegradation in soil may occur based on activated sludge studies. If released into water, dichloromethane is not expected to adsorb to suspended solids and sediment in water based upon the estimated Koc. Biodegradation is possible in natural waters but will probably be very slow compared with evaporation. 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 hr and 4 days, respectively. An estimated BCF of 2 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not an important degradation process under normal environmental conditions. Occupational exposure to dichloromethane may occur through inhalation and dermal contact with this compound at workplaces where dichloromethane is produced or used. The general population may be exposed to dichloromethane via inhalation of ambient air, ingestion of food and drinking water, and dermal contact with consumer products, such as paint strippers, which contain dichloromethane.

**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 6.1: Toxic material DOT CLASS 8: Corrosive material
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PIN Number	UN3289
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Proper Shipping Name	Toxic liquid, corrosive, inorganic, n.o.s.
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Packing Group (PG)	II
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DOT Pictograms	 
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**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.
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WHMIS Classification (Canada)	CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC). CLASS E: Corrosive liquid. On DSL.
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EINECS Number (EEC)	231-441-9 200-838-9 (Dichloromethane)
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EEC Risk Statements	R14- Reacts violently with water. R26/27/28- Very toxic by inhalation, in contact with skin and if swallowed. R34- Causes burns. R45- May cause cancer. R46- May cause heritable genetic damage. R47- May cause birth defects.
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Japanese Regulatory Data	ENCS No. 1-262 ENCS No. 2-36 (Dichloromethane)
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**Section XVI. Other Information**

**Version 1.0**  
**Validated on 1/8/2010.**  
**Printed 1/8/2010.**

**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.