

Chemical Safety Data Sheet MSDS / SDS

Chlorine trifluoride SDS

Revision Date:2024-04-25 Revision Number:1

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

Product name: Chlorine trifluoride

CAS: 7790-91-2

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

Relevant identified uses: For R&D use only. Not for medicinal, household or other use.

Uses advised against: none

Company Identification

Company: Chemicalbook.in

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SECTION 2: Hazards identification**Classification of the substance or mixture**

Skin corrosion, Sub-category 1A

Acute toxicity - Category 2, Inhalation

Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1

GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H270 May cause or intensify fire; oxidizer
H280 Contains gas under pressure; may explode if heated
H314 Causes severe skin burns and eye damage
H330 Fatal if inhaled

Precautionary statement(s)

Prevention

P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P264 Wash ... thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P271 Use only outdoors or in a well-ventilated area.
P284 [In case of inadequate ventilation] wear respiratory protection.
P273 Avoid release to the environment.

Response

P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P363 Wash contaminated clothing before reuse.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P316 Get emergency medical help immediately.
P321 Specific treatment (see ... on this label).
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P320 Specific treatment is urgent (see ... on this label).
P391 Collect spillage.

Storage

P405 Store locked up.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

Disposal

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

Substance

Chemical name:	Chlorine trifluoride
Common names and synonyms:	Chlorine trifluoride
CAS number:	7790-91-2
EC number:	232-230-4
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Refer for medical attention.

Following skin contact

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately.

Most important symptoms/effects, acute and delayed

Inhalation causes extreme irritation of respiratory tract; pulmonary edema may result. Vapors are very irritating to eyes and skin; liquid causes severe burns. (USCG, 1999)

Indication of immediate medical attention and special treatment needed, if necessary

Fluoride is protoplasmic poison that binds with calcium, inhibits enzyme systems, and activates glycolic and proteolytic mechanisms. Management consists of symptomatic and supportive care, plus the administration of calcium and the treatment of hyperkalemia. Hemodialysis may be useful in severe cases. Prognosis is largely dictated by the clinical course over the first several hours. Survival beyond 4 hours is generally associated with a favorable outcome. Fluoride

SECTION 5: Firefighting measures

Suitable extinguishing media

Do not use water. Violent reaction may result. Use appropriate extinguishing agents on nearby combustible fires. Use of dry chemical or carbon dioxide preferred.

Specific hazards arising from the chemical

Special Hazards of Combustion Products: If released from container, fumes are toxic and irritating. Behavior in Fire: If released from container, can increase the intensity of fire. Containers may explode. (USCG, 1999)

Special protective actions for fire-fighters

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep cylinder cool by spraying with water. NO direct contact with water. Combat fire from a sheltered position.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing SPECIFICALLY RECOMMENDED AS EFFECTIVE AGAINST Chlorine trifluoride, including self-contained breathing apparatus. Ventilation. Turn off gas at source if possible. NEVER direct water jet on liquid.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: complete protective clothing SPECIFICALLY RECOMMENDED AS EFFECTIVE AGAINST Chlorine trifluoride, including self-contained breathing apparatus. Ventilation. Turn off gas at source if possible. NEVER direct water jet on liquid.

Methods and materials for containment and cleaning up

1) Ventilate area of spill or leak. 2) If in gaseous form, stop flow of gas. If source of leak is cylinder & leak cannot be stopped in place, remove...to safe place in open air, & repair leak or allow cylinder to empty. 3) If in liquid form, evacuate persons not wearing protective equipment from spill area. Allow chlorine trifluoride to evaporate while providing all available ventilation.

SECTION 7: Handling and storage

Precautions for safe handling

NO contact with flammables. NO contact with water. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Fireproof. Separated from combustible substances, reducing agents and food and feedstuffs. Cool. Dry. Store in a cool, dry, well-ventilated location. Keep cylinders restrained. Separate from water, organic matter, glass, asbestos, sand, chlorofluorocarbons, acids, alkalis, halogens, slats, metal oxides. Outside or detached storage is preferred.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 0.1 ppm as STEL

Biological limit values

no data available

Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Chlorine trifluoride is a colorless gas or green liquid with a pungent odor. Boils at 53°F. It reacts with water to form chlorine and hydrofluoric acid with release of heat. Contact with organic materials may result in spontaneous ignition. It is corrosive to metals and tissue. Prolonged exposure to low concentrations or short term exposure to high concentrations may result in adverse health effects. Under prolonged exposure to fire or intense heat the container may violently rupture and rocket.
Colour:	COLORLESS GAS; LIQUID IS YELLOW-GREEN IN COLOR; SOLID IS WHITE
Odour:	SOMEWHAT SWEET, SUFFOCATING ODOR
Melting point/freezing point:	-76°C
Boiling point or initial boiling point and boiling range:	12°C
Flammability:	Nonflammable Gas Noncombustible Liquid, but contact with organic materials may result in SPONTANEOUS ignition.

Lower and upper explosion limit/flammability limit:	no data available
Flash point:	no data available
Auto-ignition temperature:	no data available
Decomposition temperature:	no data available
pH:	no data available
Kinematic viscosity:	0.448 mPa-s @ 290 deg K (liquid)
Solubility:	Reacts with water (NIOSH, 2016)
Partition coefficient n-octanol/water:	no data available
Vapour pressure:	1.4 atm (NIOSH, 2016)
Density and/or relative density:	3.18 (Relative vapour density (air = 1))
Relative vapour density:	More than three times that of air
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

Decomposes above 220°C . This produces toxic gases of chlorine and fluorine compounds. Reacts violently with water and glass. Reacts with all forms of plastics, rubber and resins, except the highly fluorinated polymers. Most combustible materials ignite spontaneously on contact with this substance. Reacts violently with oxidizable materials, metals and metal oxides. Contact with organic materials causes explosion. Contact with acids causes emission of highly toxic fumes.

Chemical stability

Unstable/ in moist air...

Possibility of hazardous reactions

Spontaneously combusts on contact with organic or silicacious matter. The gas is heavier than air. CHLORINE TRIFLUORIDE is a low-boiling liquid (b.p. 12° C) which is irritating and toxic in the gaseous state. A highly reactive oxidant, it is spontaneously flammable and used as a rocket propellant. It is incompatible with fuels and nitro compounds. Interaction with water is violent and may be explosive, even with ice [Sidgwick, 1950, p. 1156]. It undergoes an immediate explosive reaction on contact with hydrocarbons or halocarbons even at -70° C [Brower, K. R., J. Fluorine Chem., 1986, 31, p. 333]. Solutions with carbon tetrachloride are capable of detonation, while solutions with nitroaryl compounds (TNT, hexanitrobiphenyl) or highly chlorinated compounds are extremely shock-sensitive. Violent, sometimes explosive reaction with hydrogen containing materials, e.g., acetic acid, ammonia, benzene, ether, coal gas, hydrogen, hydrogen sulfide, methane, or fluoroamino compounds. Ignition with fibrous materials (cotton, paper, wood). [Mellor, 1956, vol. 2, suppl. 1, p. 155]. Explosive gaseous products (chlorodifluoroamine) are formed with ammonium fluoride or ammonium hydrogen fluoride [Gardner, D. M. et al., Inorg., Chem., 1963, 2, p. 413]. Ignition occurs on contact with iodine, boron-containing materials (boron powder, tetraboron carbide, boron-aluminum), fibrous or finely divided refractory materials (asbestos, glass, wool, sand, tungsten carbide). Violent reactions occur with mineral acids (nitric acid, sulfuric acid), chromium trioxide, ruthenium metal, selenium tetrafluoride. [Bretherick, 5th ed., 1995, p. 1235]. Chlorine trifluoride is a hypergolic oxidizer and contact with a number of metals and their oxides (aluminum, antimony, arsenic, calcium, copper, iridium, iron, lithium, lead, magnesium, molybdenum, osmium, potassium, rhodium, sodium, selenium, silver, tellurium, tin, tungsten, zinc), nonmetals (phosphorus, silicon, sulfur), salts (mercury iodide, potassium iodide, silver, nitrate, potassium carbonate) will result in a violent reaction often followed by ignition [Mellor, 1956, vol. 2, suppl. 1, p. 155; Sidgwick, 1950, p. 1156].

Conditions to avoid

no data available

Incompatible materials

Incompatibilities: acids; ammonium fluoride; carbon tetrachloride; fluorinated polymers; fuels, hydrogen-containing materials; iodine; metals, or metal oxides, or metal salts or non-metals, or non-metal oxides; nitrocompounds; organic material; polychlorotrifluoroethylene; refractory material; water.

Hazardous decomposition products

In the vapor phase, chlorine trifluoride decomposes into a variety of substances, Cl₂, ClF, ClOF, ClO₂F, ClO₂, & HF, depending upon the availability of water; of these chlorine, hydrogen fluoride & chlorine dioxide are probably of greatest toxicologic significance.

SECTION 11: Toxicological information

Acute toxicity

Oral: no data available

Inhalation: LC50 Mouse inhalation 178 ppm/1 hr

Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

no data available

Reproductive toxicity

no data available

STOT-single exposure

The substance is corrosive to the eyes, skin and respiratory tract. Inhalation may cause lung oedema. The effects may be delayed. Medical observation is indicated. See Notes.

STOT-repeated exposure

no data available

Aspiration hazard

A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: no data available

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

Persistence and degradability

no data available

Bioaccumulative potential

no data available

Mobility in soil

no data available

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN1749 (For reference only, please check.)

IMDG: UN1749 (For reference only, please check.)

IATA: UN1749 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: CHLORINE TRIFLUORIDE (For reference only, please check.)

IMDG: CHLORINE TRIFLUORIDE (For reference only, please check.)

IATA: CHLORINE TRIFLUORIDE (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 2.3 (For reference only, please check.)

IMDG: 2.3 (For reference only, please check.)

IATA: 2.3 (For reference only, please check.)

Packing group, if applicable

ADR/RID: (For reference only, please check.)

IMDG: (For reference only, please check.)

IATA: (For reference only, please check.)

Environmental hazards

ADR/RID: Yes

IMDG: Yes

IATA: Yes

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Not Listed.

(PICCS)

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC)

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>

HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website:
http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>

ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website:
<http://www.phmsa.dot.gov/hazmat/library/erg>

Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

Other Information

Thorough flushing with an inert gas should precede any opening of apparatus that has contained chlorine trifluoride. Reacts violently

with fire extinguishing agents such as water. The occupational exposure limit value should not be exceeded during any part of the working exposure. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Insufficient data are available on the effect of this substance on human health, therefore utmost care must be taken. Do NOT spray water on leaking cylinder (to prevent corrosion of cylinder). See ICSC 0283.

Disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. We as supplier shall not be held liable for any