The Kerala Minerals and Metals Limited

(A Government of Kerala Undertaking)
Sankaramangalam, Chavara, Kollam - 691583
Kerala, India

MATERIAL SAFETY DATA SHEET

TITANIUM TETRACHLORIDE

1. PRODUCT IDENTIFICATION		
CHEMICAL NAME	:	TITANIUM TETRACHLORIDE
SYNONYMS	:	ANHYDROUS TITANIUM TETRACHLORIDE, TETRACHLORO TITANIUM, TITANIUM (IV) CHLORIDE
TRADE NAME	:	TICKLE

2. COMPOSITION / INFORMATION ON INGREDIENTS		
MATERIAL OR COMPONENT	CAS NO.	%
TITANIUM TETRACHLORIDE	7550-45-0	99.95

3. HAZARD IDENTIFICATION

POTENTIAL HEALTH EFFECTS

EYES	:	Irritating to eyes and respiratory system
SKIN	:	Causes burns
INGESTION	:	No ingestion hazard during normal industrial use. If ingested by any chance, it is irritating and corrosive.

4. FIRST AID MEASURES

INHALATION	:	The patient should be removed to fresh air, kept warm and at rest, administer artificial respiration if breathing has stopped. The irritation may cause coughing, and oxygen may be administered to provide relief.

EYES	:	First, the eyelids and adjacent facial structure should be wiped thoroughly with a dry cloth. Then large quantities of water should be used to wash out the eye. Medical attention is to be obtained immediately.
SKIN	:	If clothing is contaminated with titanium tetra chloride, remove it before washing since it could remain heated up causing thermal burns.

5. FIRE FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA	:	No fire hazard
EXTINGUISHING MEDIA WHICH MUST NOT BE USED	:	Not applicable
FIRE AND EXPLOSION HAZARD	:	Fire fighting and other emergency personnel should be made aware that the white fumes produced during the hydrolysis of titanium tetrachloride is not smoke and that the use of conventional fire fighting techniques involving water sprays should not be employed. When fire and a small leak of titanium tetrachloride are simultaneously encountered high expansion foam should be considered. Under no circumstances should water be used to extinguish the fire.
SPECIAL PROTECTIVE EQUIPMENT	:	None

6. ACCIDENTAL RELEASE MEASURES

Evacuate peoples from nearby area. Ask people not to be panicky as it will be only smoke screen unless liquid $TiCl_4$ falls on body. People should be advised not to lock themselves behind closed doors. Trained personnel will be required. Efforts should be made to contain the spillage before it enters drains, culvert etc.

7. HANDLING AND STORAGE

HANDLING	:	Full face protection and long gloves should be worn at all times. If there is any possibility of spillage, full acid-resistant clothing (e.g. PVC suit) should be worn. Adequate ventilation must be provided. Care should be taken when opening drums and tank containers as a pressure of hydrogen chloride may have developed. Air coming into contact with titanium tetrachloride should have a dew point of at least-40 degree centigrade. Titanium Tetra Chloride should be discharged from drums by gravity or by pumping. Following first aid equipment must be readily available: eye wash, safety shower, dry absorbent clothes, breathing apparatus and appropriate protective clothing.

STORAGE	:	Titanium Tetrachloride should be stored in a covered, dry, well ventilated area. All drums should be visible for inspection and inspected regularly. They should not be stored more than 6 months from the date of filling. Titanium Tetrachloride is supplied in 200 litre MS drums or specific containers supplied by customers and approved by KMML. Transfer procedures and storage must be designed and operated by technically competent persons. Water or water vapour must be rigorously excluded. In the presence of water, hydrogen chloride (hydrochloric acid) will be formed which may attack metal surfaces producing hydrogen, which is highly flammable and potentially explosive.

8. EXPOSURE CONTROL/ PERSONAL PROTECTION

RESPIRATORY PROTECTION	:	Low concentration exposures (not exceeding 50 ppm HCl equivalent), cartridge or canister respirators, acid-gases type, are suitable.
HAND PROTECTION	:	Long acid resistant gloves preferably of nitrile rubber must be worn
EYE PROTECTION	:	Full-face protection against liquid splashes must be worn. Combined face and respiratory protection is recommended in practice.
SKIN PROTECTION	:	If contact is likely, full body protection against corrosive liquids must be used.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	:	Colourless to pale yellow liquid
ODOUR	:	Pungent fumes of hydrochloric acid
BOILING POINT	:	136.4 ^{0}C
FLASH POINT	:	Not flammable
EXPLOSIVE PROPERTIES	:	Not applicable
VAPOUR PRESSURE	:	1.2 kPa at 20 ^{0}C
SOLUBILITY	:	Reacts violently with water, aqueous solutions and many organic liquids. Miscible with some hydrocarbons and halogenated hydrocarbons.
MELTING POINT	:	-24^{0}C
SPECIFIC GRAVITY	:	1.728 g/cm^{3} at 20 ^{0}C
VISCOSITY	:	0.827 mPa s

10. STABILITY AND REACTIVITY

STABILITY	:	Stable at ambient temperature in closed moisture free storage.
MATERIALS TO AVOID	:	Reacts vigorously with water and may be other aqueous solutions.
HAZARDOUS DECOMPOSITION	:	Hydrogen chloride (hydrochloric acid) will be produced in the presence of water
PRODUCTS	:	Hydrogen gas may be formed in moisture.

11. TOXICOLOGICAL INFORMATION

Acute health effects	Eye contact	Skin contact
These arise from the vigorously exothermic hydrolysis reaction with the production of hydrochloric acid. In contact with skin or other tissue, titanium tetrachloride takes up moisture and hot concentrated hydrochloric acid is formed. Thus both a thermal burn and a corrosive acid burn may occur, accompanied by severe tissue damage. The eyes are the most vulnerable. Similarly, the inhalation of titanium tetrachloride vapour or fumes will deposit hydrochloric acid droplets in the upper respiratory tract causing irritation and possible damage. If liquid titanium tetrachloride is accidentally swallowed, the corrosive effects will predominate.	Liquid titanium tetrachloride will cause immediate and severe irritation. It is likely to cause damage that could result in impairment of vision or total loss of sight. The vapour, or hydrochloric acid mist, is also irritant, and may cause damage if contact is prolonged	The liquid will cause damage if allowed to remain in contact with the skin, with blistering and in severe cases, ulceration and destruction of tissue. The vapour or hydrochloric acid mist is also irritating if contact is prolonged.

12. ECOLOGICAL INFORMATION

At low concentrations, chloride ions are a constituent of many natural systems. High concentrations will affect the environment, with adverse effects on living organisms.

13. DISPOSAL

Disposal of unwanted or contaminated titanium tetrachloride may give rise to harmful environmental conditions, particularly if no attempt is made to neutralize the acidic hydrolysis products. Drums should be emptied to process as far as is practicable, and in any case should not contain more than half a litre of titanium tetrachloride. Personnel involved in the drum disposal process should be familiar with handling titanium tetrachloride and should

wear protective clothing. The drum should be moved to a facility with a fume extraction and associated fume scrubbing system. The drum should be placed in an upright position and the bungs slowly removed. A wash down hose should be inserted through the main drum opening until it reaches the bottom of the drum. From a position away from the drum, the water should be turned on to a low flow rate. When the drum is absolutely one third full the water should be turned off and the hose removed from the drum before adding between 1 and 2 kilograms of anhydrous soda ash. The water hose should be replaced and inserted to the bottom of the drum and the water is turned on. Once the liquid begins to over flow the water should be turned off. The solution should be left inside the drum until a neutral pH is noted. Once the solution is neutral the water should be turned on and the solution allowed to over flow until the liquid is clear. Once the solution is clear the drum should be emptied down a suitable drain and the emptied drum holed several times to prevent re-use. The drum can now be safely disposed off as scrap.

14. TRANSPORT INFORMATION

LABEL	:	Corrosive + Toxic
UN NUMBER	:	1838
SEA (IMDG)	:	Class 6.1, Subsidiary risk 8, Packing Group - I
ROAD (ADR)	:	Class 6.1, Label 6.1+8, Packing Group - I
RAIL (RID)	:	Class 6.1, Label 6.1+8, Packing Group - I
AIR (IATA)	:	Forbidden for transport

15. REGULATORY INFORMATION

HAZARD CLASSIFICATION	:	Corrosive & toxic
RISK PHRASES	:	Reacts violently with water, cause burns, irritating to eyes and respiratory system.
SAFETY PHRASES	:	Keep container tightly closed and dry. In case of contact with eyes wipe the eyelids with a dry and clean tissue and then wash eyes with large quantities of water, ensuring that irrigation is complete by holding the eyelids open. Washing should continue until professional assistance is provided.

16. OTHER INFORMATION

NIL

Prepared by: Titanium dioxide Pigment Unit, The Kerala Minerals and Metals Limited
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