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FERRIC CHLORIDE, HEXAHYDRATE
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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

CAS NUMBER 10025-77-1
SUBSTANCE: **FERRIC CHLORIDE, HEXAHYDRATE**

TRADE NAMES/SYNONYMS:
FERRIC TRICHLORIDE, HEXAHYDRATE; IRON (III) CHLORIDE, HEXAHYDRATE;
IRON TRICHLORIDE, HEXAHYDRATE; 186; 187; 188; IRON CHLORIDE, HEXAHYDRATE;
IRON(3+) CHLORIDE, HEXAHYDRATE; STCC 4944138; UN 1773; ACC09754

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: FE-CL₃.6H₂O

MOLECULAR WEIGHT: 270.32

CECLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=3
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: FERRIC CHLORIDE, HEXAHYDRATE PERCENT: 100
CAS# 10025-77-1

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

IRON SALTS, SOLUBLE, AS FE:
1 MG/M³ OSHA TWA
1 MG/M³ ACGIH TWA
1 MG/M³ NIOSH RECOMMENDED TWA

OSHA LIMITS ADOPTED JANUARY 19, 1989 ARE SUBJECT TO THE DECISION OF THE 11TH CIRCUIT COURT OF APPEALS (AFL-CIO V. OSHA) AS OF JULY 7, 1992.

PHYSICAL DATA

DESCRIPTION: BROWNISH-YELLOW OR ORANGE, VERY DELIQUESCENT, MONOCLINIC

CRYSTALS WITH A SLIGHT ODOR OF HYDROGEN CHLORIDE.

BOILING POINT: 536 F (280 C) MELTING POINT: 99 F (37 C)

SPECIFIC GRAVITY: 1.82 PH: 2.0 (0.1 M AQ SOLN)

SOLUBILITY IN WATER: 91.9% @ 20 C

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, ACETONE, ETHER

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE

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IS OUT. STAY AWAY FROM ENDS OF TANKS (1990 EMERGENCY RESPONSE GUIDEBOOK,
DOT P 5800.5, GUIDE PAGE 60).

USE AGENTS SUITABLE FOR TYPE OF FIRE. AVOID BREATHING CORROSIVE VAPORS. KEEP
UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49-CFR 172.101:
ORM-B

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49-CFR 172.101 AND
SUBPART E:
NONE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49-CFR 173.510
EXCEPTIONS: 49-CFR 173.505

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180),
DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204.
EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS
AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE
EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO
OCTOBER 1, 1993. (56 FR 47158, 09/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
FERRIC CHLORIDE-UN 1773

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - CORROSIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG III

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
CORROSIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.154
NON-BULK PACKAGING: 49 CFR 173.213
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 25 KG
CARGO AIRCRAFT ONLY: 100 KG

TOXICITY

FERRIC CHLORIDE:

TOXICITY DATA:
ANHYDROUS: 450 MG/KG ORAL-RAT LD50; 895 MG/KG ORAL-MOUSE LD50; 58 MG/KG
INTRAVENOUS-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS
DATA (RTECS).
HEXAHYDRATE: 900 MG/KG ORAL-RAT LDLO; 260 MG/KG INTRAPERITONEAL-MOUSE LD50;
7200 UG/KG INTRAVENOUS-RABBIT LDLO; MUTAGENIC DATA (RTECS).
DODECAHYDRATE: NO DATA AVAILABLE.
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: TOXIC BY INGESTION.
TARGET EFFECTS: POISONING MAY AFFECT THE DIGESTIVE TRACT, RESPIRATORY,
CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEMS, LIVER AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

FERRIC CHLORIDE:
CORROSIVE.
ACUTE EXPOSURE- DUST OR MIST MAY CAUSE SEVERE RESPIRATORY TRACT IRRITATION,
SORE THROAT, COUGH, DYSPNEA, AND LABORED BREATHING.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY CAUSE MUCOUS MEMBRANE
IRRITATION.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING
HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD
PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND
AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN
SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION
IMMEDIATELY.

SKIN CONTACT:

FERRIC CHLORIDE:
CORROSIVE.
ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE IRRITATION, PAIN, AND BURNS.
CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE.

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REPEATED OR PROLONGED CONTACT WITH CORROSIVE SUBSTANCES MAY RESULT IN DERMATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
FERRIC CHLORIDE:
CORROSIVE

ACUTE EXPOSURE- DIRECT CONTACT WITH THE EYE MAY CAUSE REDNESS, PAIN, BLURRED VISION, AND LACRIMATION. CORNEAL INJURY AND BURNS ARE POSSIBLE.
CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE.
REPEATED OR PROLONGED CONTACT WITH CORROSIVE SUBSTANCES MAY RESULT IN CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
FERRIC CHLORIDE:
CORROSIVE/TOXIC

ACUTE EXPOSURE- ABDOMINAL PAIN, RETCHING AND PROLONGED VOMITING MAY BEGIN 10-60 MINUTES AFTER EXCESSIVE INGESTION OF SOLUBLE IRON SALTS.
HEMATEMESIS, WATERY AND THEN TARRY DIARRHEA, INTENSE DEHYDRATION, SHOCK, PALLOR, CYANOSIS, HYPOTHERMIA, RAPID, WEAK OR IMPERCEPTIBLE PULSE, HYPOTENSION, RAPID RESPIRATION, ACIDOSIS, COAGULATION DEFECTS, DROWSINESS, HYPOREFLEXIA, VASOMOTOR INSTABILITY, DILATED PUPILS AND COMA MAY FOLLOW. DEATH FROM SHOCK MAY OCCUR WITHIN 4-8 HOURS. IF DEATH IS NOT IMMEDIATE, THE VICTIM MAY IMPROVE, BUT CYANOSIS, PULMONARY EDEMA, PNEUMONITIS FROM ASPIRATION OF VOMITUS, HYPERTHERMIA, ACIDOSIS, ANURIA, SHOCK, CONVULSIONS, COMA AND DEATH MAY OCCUR 1-3 DAYS LATER. AFTER 2 DAYS, SURVIVORS MAY DEVELOP HEMORRHAGIC HEPATIC NECROSIS, WHICH IS USUALLY REVERSIBLE. GASTRIC SCARRING AND CONTRACTION AND PYLORIC OBSTRUCTION MAY OCCUR AFTER 4 WEEKS. PYLORIC STENOSIS AND MILD HEPATIC CIRRHOSIS MAY PERSIST.
CHRONIC EXPOSURE- REPEATED DOSAGE MAY CAUSE HEMOSIDEROSIS WITH POSSIBLE DAMAGE TO THE LIVER AND PANCREAS.

FIRST AID- IN PATIENTS NOT IN SHOCK OR COMA, INDUCE EMESIS WITH SYRUP OF IPECAC IF VOMITING HAS NOT OCCURRED. FOLLOW WITH GASTRIC LAVAGE USING DEFEROXAMINE, 2 GRAMS IN 1 LITER OF WATER CONTAINING SODIUM BICARBONATE, 20 GM/L. LEAVE 10 GRAMS OF DEFEROXAMINE IN 50 ML OF 5% SODIUM BICARBONATE IN THE STOMACH. MAINTAIN AIRWAY, BLOOD PRESSURE AND RESPIRATION. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. (DREISBACH, HANDBOOK OF POISONING, 11TH ED.) GET MEDICAL ATTENTION IMMEDIATELY. TREATMENT SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

IRON SALT POISONING:
GIVE DEFEROXAMINE, 15 MG/KG/HOUR BY CONTINUOUS INTRAVENOUS INFUSION TO A MAXIMUM OF 80 MG/KG IN EACH 12-HOUR PERIOD. MONITOR THE BLOOD PRESSURE DURING ADMINISTRATION OF DEFEROXAMINE AND REDUCE THE RATE OF ADMINISTRATION IF THE BLOOD PRESSURE FALLS. SINGLE DOSES SHOULD NOT EXCEED 1 GRAM AND THE MAXIMUM BLOOD PRESSURE SHOULD NOT EXCEED 6 GRAMS. DEFEROXAMINE IS HAZARDOUS IN PATIENTS WITH SEVERE RENAL DISEASE OR ANURIA, AND DIALYSIS IS NECESSARY. INJECTED DEFEROXAMINE IS ASSOCIATED WITH A HIGH RISK AND SHOULD BE RESERVED FOR SERIOUS POISONING. CONTINUE DEFEROXAMINE THERAPY UNTIL THE PATIENT IS FREE OF SYMPTOMS AND SIGNS FOR 24 HOURS (DREISBACH, HANDBOOK OF POISONING, 11TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
FERRIC CHLORIDE: SOLID, ANHYDROUS:
ALLYL CHLORIDE: MAY CATALYZE VIOLENT POLYMERIZATION.
AROMATIC MONOMERS: MAY CATALYZE VIOLENT POLYMERIZATION.
ETHYLENE OXIDE: MAY CATALYZE VIOLENT POLYMERIZATION.
METHALS: SOLUTION IS HIGHLY CORROSIVE.
POTASSIUM: MAY CAUSE EXPLOSION ON IMPACT WITH THE SOLID.
SODIUM: MAY CAUSE EXPLOSION ON IMPACT WITH THE SOLID.

DECOMPOSITION:
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC AND CORROSIVE FUMES OF CHLORINE.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL

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TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

STORAGE

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. FLAMMABLE. POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. MAY IGNITE COMBUSTIBLES (WOOD, PAPER, OIL, ETC.).

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG A PIT, POND, LAGOON OR HOLDING AREA TO CONTAIN LIQUID OR SOLID MATERIAL. COVER SOLIDS WITH A PLASTIC SHEET TO PREVENT DISSOLVING IN RAIN OR FIREFIGHTING WATER.

WATER SPILL:
NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE OR SODIUM BICARBONATE.

ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE. MUST BE BASED ON THE SPECIFIC OPERATION. MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ANY DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.

ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.

ANY TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

ANY SELF-CONTAINED BREATHING APPARATUS THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

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ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

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