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\*\*FERROUS SULFATE, HEPTAHYDRATE\*\*  
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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 7782-63-0  
SUBSTANCE: \*\*FERROUS SULFATE, HEPTAHYDRATE\*\*

TRADE NAMES/SYNONYMS:

IRON(II) SULFATE; FERROUS SULFATE HEPTAHYDRATE;  
IRON(2+) SULFATE HEPTAHYDRATE; IRON(II) SULFATE (1:1), HEPTAHYDRATE;  
FERROUS SULFATE; SULFURIC ACID, IRON(2+) SALT (1:1), HEPTAHYDRATE;  
IRON SULFATE; COPPERAS; GREEN VITRIOL; I-146; I-149; I-151; STCC 4963841;  
UN 9125; FEH7O11S; ACC09870

CHEMICAL FAMILY:  
INORGANIC SALT

MOLECULAR FORMULA: FE-S-O4.7(H2-O)

MOLECULAR WEIGHT: 278.01

CERCLA 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: FERROUS SULFATE, HEPTAHYDRATE PERCENT: 100.0  
CAS# 7782-63-0

EXPOSURE LIMITS:

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

FERROUS SULFATE:

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

\*\*OSHA REVOKED THE FINAL RULE LIMITS OF JANUARY 19, 1989 IN RESPONSE TO THE 11TH CIRCUIT COURT OF APPEALS DECISION (AFL-CIO V. OSHA) EFFECTIVE JUNE 30, 1993. SEE 29 CFR 1910.1000 (58 FR 35338)\*\*

PHYSICAL DATA

DESCRIPTION: ODORLESS, HYGROSCOPIC, BLUE-GREEN, MONOCLINIC CRYSTALS.

MELTING POINT: DECOMPOSES SPECIFIC GRAVITY: 1.898 PH: 3.7 @ 10% SOLUTION

SOLUBILITY IN WATER: 15.65% @ 20 C

SOLVENT SOLUBILITY: SOLUBLE IN ABSOLUTE METHANOL; SLIGHTLY SOLUBLE IN ETHANOL.

LOSES WATER OF HYDRATION TO FORM MONOHYDRATE ABOVE 147 F (64 C) AND ANHYDROUS SALT ABOVE 572 F (300 C).

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).

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FIREFIGHTING:

MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. DO NOT SCATTER SPILLED MATERIAL WITH HIGH-PRESSURE WATER STREAMS. DIKE FIRE-CONTROL WATER FOR LATER DISPOSAL (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 31).

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS VAPORS, KEEP UPWIND.

TOXICITY

FERROUS SULFATE:

TOXICITY DATA:

ANHYDROUS: 390 MG/KG ORAL-CHILD LDLO; 20 MG/KG ORAL-CHILD TDLO; 150 MG/KG ORAL-CHILD TDLO; 10,560 UG/KG ORAL-WOMAN TDLO; 600 MG/KG ORAL-WOMAN TDLO; 319 MG/KG ORAL-RAT LD50; 680 MG/KG ORAL-MOUSE LD50; 1200 MG/KG ORAL-GUINEA PIG LD50; 155 MG/KG SUBCUTANEOUS-RAT LD50; 60,300 UG/KG SUBCUTANEOUS-MOUSE LD50; 112 MG/KG INTRAVENOUS-MOUSE LD50; 79 MG/KG INTRAVENOUS-DOG LD50; 289 MG/KG INTRAPERITONEAL-MOUSE LD50; 200 MG/KG INTRADUODENAL-RABBIT LDLO; 441 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).  
MONOHYDRATE: NO DATA AVAILABLE.  
HEPTAHYDRATE: 1389 MG/KG ORAL-RAT LDLO; 1520 MG/KG ORAL-MOUSE LD50; 2778 MG/KG ORAL-RABBIT LDLO; 279 MG/KG SUBCUTANEOUS-RABBIT LDLO; 51 MG/KG INTRAVENOUS-MOUSE LD50; 99 MG/KG INTRAVENOUS-RABBIT LDLO; 245 MG/KG INTRAPERITONEAL-MOUSE LD50; 697 MG/KG RECTAL-RAT LDLO; MUTAGENIC DATA (RTECS).

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- EYE, INGESTION; IRRITANT- INHALATION, SKIN.  
ACUTE TOXICITY LEVEL: TOXIC BY INGESTION (ANHYDROUS); MODERATELY TOXIC BY INGESTION (HEPTAHYDRATE).

TARGET EFFECTS: POISONING MAY AFFECT THE LIVER, KIDNEYS, CIRCULATORY, CARDIOVASCULAR AND CENTRAL NERVOUS SYSTEMS.  
ADDITIONAL DATA: INTERACTIONS WITH MEDICATIONS HAVE BEEN REPORTED.

HEALTH EFFECTS AND FIRST AID

INHALATION:

FERROUS SULFATE:

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT.  
CHRONIC EXPOSURE- NO DATA AVAILABLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

FERROUS SULFATE:

IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION.  
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO IRRITANTS MAY CAUSE DERMATITIS.

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 (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

FERROUS SULFATE:

CORROSIVE.

ACUTE EXPOSURE- CONTACT WITH THE EYE MAY CAUSE SEVERE IRRITATION AND CORROSIVE ACTION DUE TO THE ACIDITY OF THE SOLUTION.  
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:

FERROUS SULFATE:

CORROSIVE/TOXIC.

ACUTE EXPOSURE- SIDE EFFECTS OF INGESTION OF IRON SALTS MAY INCLUDE HEARTBURN, METALLIC TASTE IN THE MOUTH, NAUSEA, UPPER GASTRIC DISCOMFORT, AND CONSTIPATION OR DIARRHEA. SYMPTOMS OF SEVERE POISONING MAY OCCUR WITHIN 30 MINUTES OR BE DELAYED FOR SEVERAL HOURS. SEVERE HEMORRHAGIC GASTRITIS WITH ABDOMINAL PAIN, RETCHING, VIOLENT DIARRHEA AND VOMITING MAY OCCUR. THE VOMITUS MAY BE BLOODY. DEHYDRATION MAY BECOME INTENSE. THE CIRCULATORY SYSTEM MAY BE AFFECTED WITH SYMPTOMS OF SHOCK, PALLOR, CYANOSIS AND COLDNESS, RAPID WEAK OR IMPERCEPTIBLE PULSE, SEVERE HYPOTENSION AND PULMONARY CHANGES WITH DYSPNEA, FOCAL ATELECTASIS AND EMPHYSEMA MAY OCCUR. OTHER SYMPTOMS MAY INCLUDE HEMOCONCENTRATION,

TACHYCARDIA, LETHARGY, DROWSINESS, MENTAL CONFUSION, HYPOTONIA AND HYPERGLYCEMIA. IF POISONING IS NOT IMMEDIATELY FATAL, THE PATIENT MAY BE ASYMPTOMATIC FOR 24 HOURS, AFTER WHICH SYMPTOMS MAY RETURN WITH CYANOSIS, CONVULSIONS, CIRCULATORY COLLAPSE, MASSIVE HEPATIC FAILURE WITH JAUNDICE, SEVERE BLEEDING WITH ALTERED CLOTTING AND BLEEDING PARAMETERS, SEVERE RENAL IMPAIRMENT OR FAILURE, DIFFUSE VASCULAR CONGESTION, PULMONARY EDEMA AND PULMONARY HEMORRHAGE, ACIDOSIS, ANURIA, HYPERTHERMIA, COMA AND DEATH WITHIN 24-48 HOURS. DEATH IS ALWAYS PRECEDED BY SHOCK. IF THE VICTIM SURVIVES, LATE COMPLICATIONS DUE TO PYLORIC, ANTRAL OR INTESTINAL OBSTRUCTION, HEPATIC CIRRHOSIS WITH FINE DIFFUSE FIBROTIC CHANGES WITH FATTY DEGENERATION AND CENTRAL NERVOUS DAMAGE MAY OCCUR 2 TO 5 WEEKS AFTER INGESTION. DEGENERATIVE CHANGES OF THE PANCREAS, LYMPH NODES, AND HEART ARE ALSO POSSIBLE. THE AVERAGE HUMAN LETHAL DOSE OF IRON IS ABOUT 200 TO 250 MG PER KG OF BODY WEIGHT.

CHRONIC EXPOSURE- REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

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. (DREIBACH, 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 IN 24 HOURS 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 (DREIBACH, HANDBOOK OF POISONING, 11TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:  
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:  
FERROUS SULFATE  
ALKALIES: INCOMPATIBLE.  
ARSENIC TRIOXIDE + SODIUM NITRATE: SPONTANEOUSLY COMBUSTIBLE MIXTURE.  
CARBONATES (SOLUBLE): INCOMPATIBLE.  
GOLD SALTS: INCOMPATIBLE.  
LEAD ACETATE: INCOMPATIBLE.  
LIMEWATER: INCOMPATIBLE.  
METHYL ISOCYANOACETATE: MAY DECOMPOSE EXPLOSIVELY AT 25 C.  
OXIDIZERS: FIRE AND EXPLOSION HAZARD.  
POTASSIUM IODIDE: INCOMPATIBLE.  
POTASSIUM TARTRATE: INCOMPATIBLE.  
SODIUM BORATE: INCOMPATIBLE.  
SODIUM TARTRATE: INCOMPATIBLE.

DECOMPOSITION:  
THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF SULFUR.

POLYMERIZATION:  
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE.

\*\*STORAGE\*\*

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

CONDITIONS TO AVOID

PREVENT DISPERSION OF DUST IN AIR.

SPILL AND LEAK PROCEDURES

SOIL SPILL:

DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

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

WATER SPILL:  
ALLOW SPILLED MATERIAL TO AERATE.

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

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

OCCUPATIONAL SPILL:  
SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH SPILLED MATERIAL INTO SEWER. KEEP UNNECESSARY PEOPLE AWAY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS  
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

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.

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 REPEATED OR PROLONGED 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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