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ZINC SULFATE, HEPTAHYDRATE
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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 7446-20-0

SUBSTANCE: **ZINC SULFATE, HEPTAHYDRATE**

TRADE NAMES/SYNONYMS:

ZINC SULFATE HEPTAHYDRATE; WHITE VITRIOL; ZINC SULFATE; ZINC SULPHATE;
ZINC VITRIOL; SULFURIC ACID, ZINC SALT (1:1), HEPTAHYDRATE;
ZINC SULFATE (ZNSO4) HEPTAHYDRATE; SULFURIC ACID, ZINC SALT;
SULFURIC ACID, ZINC SALT, HEPTAHYDRATE; STCC 4963786; H1405S2Z; Z68; Z70;
Z76; Z68TP; ACC25580

CHEMICAL FAMILY:
INORGANIC SALT

MOLECULAR FORMULA: ZN-S-O4.7H2-O

MOLECULAR WEIGHT: 287.54

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: ZINC SULFATE, HEPTAHYDRATE PERCENT: 100.0
CAS# 7446-20-0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ZINC SULFATE:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS EFFLORESCENT OR HYGROSCOPIC CRYSTALS,
GRANULES, OR POWDER WITH AN ASTRINGENT, METALLIC TASTE.

BOILING POINT: 934 F (500 C) DECOMPOSES MELTING POINT: 212 F (100 C)

SPECIFIC GRAVITY: 1.957 PH: 4.5% IN SOLUTION

SOLUBILITY IN WATER: 96.5% @ 20 C

SOLVENT SOLUBILITY: SOLUBLE IN ETHER; SLIGHTLY SOLUBLE IN GLYCERIN,
ALCOHOL

LOSES WATER OF HYDRATION ABOVE 280 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. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 60).

EXTINGUISH USING AGENTS INDICATED; DO NOT USE WATER DIRECTLY ON MATERIAL. IF LARGE AMOUNTS OF COMBUSTIBLE MATERIALS ARE INVOLVED, USE WATER SPRAY OR FOG IN FLOODING AMOUNTS. USE WATER SPRAY TO ABSORB CORROSIVE VAPORS. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS; KEEP UPWIND.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49-CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49-CFR 172.101 AND
SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49-CFR 173.245B
EXCEPTIONS: 49-CFR 173.244

TOXICITY

ZINC SULFATE:

IRRITATION DATA:
ANHYDROUS: 420 UG EYE-RABBIT MODERATE.

TOXICITY DATA:

ANHYDROUS: 45 MG/KG/7 DAYS CONTINUOUS ORAL-HUMAN TDLO; 106 MG/KG ORAL-HUMAN TDLO; 180 MG/KG/6 WEEKS INTERMITTENT ORAL-MAN TDLO; 3120 MG/KG/43 WEEKS INTERMITTENT ORAL-WOMAN TDLO; 2949 MG/KG ORAL-RAT LD50; 57 MG/KG ORAL-MOUSE LD50; 2000 MG/KG ORAL-RABBIT LDLO; 330 MG/KG SUBCUTANEOUS-RAT LDLO; 1500 UG/KG SUBCUTANEOUS-MOUSE LDLO; 300 MG/K SUBCUTANEOUS-RABBIT LDLO; 78 MG/KG SUBCUTANEOUS-DOG LDLO; 50 MG/KG INTRAVENOUS-RAT LDLO; 66 MG/KG INTRAVENOUS-DOG LDLO; 23 MG/KG INTRAVENOUS-RABBIT LDLO; 71750 UG/KG INTRAPERITONEAL-MOUSE LD50; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).
DIHYDRATE: 1710 MG/KG ORAL-RAT LD50; 926 MG/KG ORAL-MOUSE LD50; 200 MG/KG INTRAPERITONEAL-RAT LD50; 316 MG/KG INTRAPERITONEAL-MOUSE LD50; HEPTAHYDRATE: 2150 MG/KG ORAL-RAT LD50; 2200 MG/KG ORAL-MOUSE LD50; 1914 MG/KG ORAL-RABBIT LDLO; 330 MG/KG SUBCUTANEOUS-RAT LDLO; 78 MG/KG SUBCUTANEOUS-DOG LDLO; 590 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 49 MG/KG INTRAVENOUS-RAT LDLO; 66 MG/KG INTRAVENOUS-DOG LDLO; 44 MG/KG INTRAVENOUS-RABBIT LDLO; 200 MG/KG INTRAPERITONEAL-RAT LD50; 75 MG/KG INTRAPERITONEAL-MOUSE LD50; 221 MG/KG UNREPORTED-MAN LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION.
TARGET EFFECTS: POISONING MAY AFFECT THE LIVER AND KIDNEYS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ZINC SULFATE:
CORROSIVE.

ACUTE EXPOSURE- INHALATION OF DUST OR SOLUTION MIST MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT WITH SORE THROAT, COUGHING, SHORTNESS OF BREATH, LABORED BREATHING, PAIN IN THE NOSE, MOUTH, AND THROAT, AND BURNS OF THE MUCOUS MEMBRANES. IF SUFFICIENT QUANTITIES ARE INHALED, PULMONARY EDEMA MAY DEVELOP, OFTEN WITH A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE TIGHTNESS IN THE CHEST, DYSPNEA, FROTHY SPUTUM, CYANOSIS, AND DIZZINESS. PHYSICAL FINDINGS MAY INCLUDE WEAK, RAPID PULSE, HYPOTENSION, HEMOCOCONCENTRATION, AND MOIST RALES.
CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED EXPOSURE TO CORROSIVE SUBSTANCES MAY CAUSE INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH AND POSSIBLY BRONCHIAL AND GASTROINTESTINAL DISTURBANCES.

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:
ZINC SULFATE:
CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT WITH CORROSIVE SUBSTANCES MAY CAUSE SEVERE IRRITATION, REDNESS, PAIN, AND POSSIBLY BURNS.
CHRONIC EXPOSURE- EFFECTS DEPEND ON CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH METAL SALTS MAY RESULT IN DERMATITIS WITH ERYTHEMATOUS, PAPULAR, AND GRANULOMATOUS REACTIONS IN SUSCEPTIBLE INDIVIDUALS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

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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:
ZINC SULFATE:
CORROSIVE

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE IRRITATION, REDNESS, PAIN, BLURRED VISION, AND BURNS, POSSIBLY SEVERE. THE DEGREE OF INJURY DEPENDS ON THE CONCENTRATION AND DURATION OF CONTACT. THE FULL EXTENT OF THE INJURY MAY NOT BE IMMEDIATELY APPARENT. APPLICATION OF A 20% ZINC SULFATE SOLUTION TO CORNEAS INFECTED WITH HERPETIC KERATITIS ULCERS RESULTED IN EDEMA AND RESIDUAL SCARRING UPON HEALING.

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:
ZINC SULFATE:
CORROSIVE.

ACUTE EXPOSURE- INGESTION MAY CAUSE A BURNING PAIN IN THE MOUTH AND THROAT, FEVER, NAUSEA, VIOLENT VOMITING WITH SEVERE ABDOMINAL PAIN, WATERY OR BLOODY DIARRHEA, PROSTRATION, TENESMUS, RETCHING, HYPERGLYCEMIA, ANURIA, LIVER DAMAGE, KIDNEY DAMAGE WITH ALBUMINURIA, ACETONURIA, AND GLYCOSURIA, HYPOTENSION, SUDDEN COLLAPSE, AND CONVULSIONS.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION OF CORROSIVE SUBSTANCES MAY RESULT IN EFFECTS AS WITH ACUTE INGESTION. PROLONGED INGESTION OF 33,000 MG/KG IN DRINKING WATER RESULTED IN SEVERE ANEMIA IN MICE. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS FROM THE ANHYDROUS AND THE HEPTAHYDRATE.

FIRST AID- DILUTE THE POISON IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR MILK AND REMOVE BY GASTRIC LAVAGE UNLESS THE VICTIM IS ALREADY VOMITING. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.) GET MEDICAL ATTENTION IMMEDIATELY. ADMINISTRATION OF GASTRIC LAVAGE SHOULD BE PERFORMED 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.

POISONING FROM ZINC SALTS:
GIVE CALCIUM DISODIUM EDETATE 15-25 MG/KG (0.08-0.125 ML OF 20% SOLUTION PER KILOGRAM OF BODY WEIGHT) IN 250-500 ML OF 5% DEXTROSE INTRAVENOUSLY OVER A 1 TO 2 HOUR PERIOD TWICE DAILY. THE MAXIMUM DOSE SHOULD NOT EXCEED 50 MG/KG/DAY. THE DRUG SHOULD BE GIVEN IN 5-DAY COURSES WITH A REST PERIOD OF AT LEAST 2 DAYS BETWEEN COURSES. AFTER THE FIRST COURSE, SUBSEQUENT COURSES SHOULD NOT EXCEED 50 MG/KG/DAY. DAILY URINALYSES SHOULD BE DONE DURING THE TREATMENT PERIOD. THE DOSAGE SHOULD BE REDUCED IF ANY UNUSUAL URINARY FINDINGS APPEAR.

FOR INTRAMUSCULAR ADMINISTRATION, GIVE 12.5 MG/KG BODY WEIGHT EVERY 4-6 HOURS. DILUTE EACH DOSE WITH AN EQUAL VOLUME OF 1% PROCAINE. DOSE LIMITATION IS THE SAME AS THAT GIVEN ABOVE. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
ZINC SULFATE:
OXIDIZERS: INCOMPATIBLE.
SEE ALSO METAL SULFATES.

METAL SULFATES:
ALUMINUM: POSSIBLE EXPLOSION ON MELTING.
MAGNESIUM: POSSIBLE EXPLOSION.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE TOXIC FUMES OF ZINC OXIDE OR TOXIC OXIDES OF SULFUR.

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

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STORAGE AND DISPOSAL

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

STORAGE

STORE IN A COOL, DRY PLACE; KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

***** 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.

NEUTRALIZE WITH CAUSTIC SODA.

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.

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

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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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