

OCCUPATIONAL HEALTH SERVICES, INC.
11 WEST 42ND STREET, 12TH FLOOR
NEW YORK, NEW YORK 10036
1-800-445-MSDS (1-800-445-6737) OR 1-212-789-3535

FOR EMERGENCY SOURCE INFORMATION
CONTACT: 1-615-366-2000

SUBSTANCE IDENTIFICATION

CAS-NUMBER 75-21-8
RTEC-NUMBER KX2450000

SUBSTANCE: ETHYLENE OXIDE

TRADE NAMES/SYNONYMS:

OXIRANE: DIHYDROOXIRENE: DIMETHYLENE OXIDE: EPOXYETHANE:
1,2-EPOXYETHANE: ETHENE OXIDE: ETO: EO: OXACYCLOPROPANE: OXANE:
OXIDOETHANE: ALPHA,BETA-OXIDOETHANE: OXIRAN: RCRA U115: STCC
4906610: UN 1040: C2H4O: OHS09520

CHEMICAL FAMILY:
EPOXY

MOLECULAR FORMULA: (C-H2)2-O MOLECULAR WEIGHT: 44.06

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=3 REACTIVITY=3 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=4 REACTIVITY=3

COMPONENTS AND CONTAMINANTS

COMPONENT: ETHYLENE OXIDE CAS# 75-21-8 PERCENT: 99.7

OTHER CONTAMINANTS: WATER, ACETALDEHYDE, ACETIC ACID

EXPOSURE LIMIT:

ETHYLENE OXIDE:
1 PPM OSHA TWA; 5 PPM OSHA 15 MINUTE EXCURSION LIMIT;
0.5 PPM OSHA TWA ACTION LEVEL
1 PPM ACGIH TWA
ACGIH A2-SUSPECTED HUMAN CARCINOGEN.
NOT TO EXCEED 0.1 PPM NIOSH RECOMMENDED 8 HOUR TWA;
5 PPM NIOSH RECOMMENDED 10 MINUTE CEILING

1000 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
1 POUND SARA SECTION 304 REPORTABLE QUANTITY
10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING
SUBJECT TO CALIFORNIA PROPOSITION 65 CANCER AND/OR REPRODUCTIVE TOXICITY
WARNING AND RELEASE REQUIREMENTS- (FEBRUARY 27, 1987)

PHYSICAL DATA

DESCRIPTION: COLORLESS LIQUID OR GAS WITH AN ETHER-LIKE ODOR.

BOILING POINT: 55 F (13 C) MELTING POINT: -168 F (-111 C)

SPECIFIC GRAVITY: 0.8824 @ 10 C VOLATILITY: 100%
SOLUBILITY IN WATER: COMPLETE VAPOR DENSITY: 1.5
VAPOR PRESSURE: 1095 MMHG @ 20 C ODOR-THRESHOLD: 500 PPM
OTHER SOLVENTS (SOLVENT - SOLUBILITY):
SOLUBLE IN ALCOHOL, ETHER, ACETONE, BENZENE,
CARBON TETRACHLORIDE, ORGANIC SOLVENTS.

OTHER PHYSICAL DATA

VISCOSITY: 0.0095 CPS @ 25 C (GAS); 0.310 CPS @ 0 C (LIQUID)

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: -20 F (-29 C) (CC) UPPER EXPLOSION LIMIT: 100%
LOWER EXPLOSION LIMIT: 3% AUTOIGNITION TEMP.: 804 F (429 C)

FLAMMABILITY CLASS (OSHA): 1A

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR ALCOHOL-RESISTANT FOAM
(1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

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

FIREFIGHTING:

LET BURN UNLESS LEAK CAN BE STOPPED IMMEDIATELY. MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. FIGHT FIRE FROM MAXIMUM DISTANCE. STAY AWAY FROM ENDS OF TANKS. FOR MASSIVE FIRE IN CARGO AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; IF THIS IS IMPOSSIBLE, WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF TANK DUE TO FIRE. ISOLATE FOR 1 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR OR TANK TRUCK IS INVOLVED IN FIRE (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 69).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS A FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE. COOL CONTAINERS WITH FLOODING QUANTITIES OF WATER. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND. EVACUATE TO A RADIUS OF 5000 FEET IF FIRE IS PROLONGED AND MATERIAL IS CONFINED IN THE CONTAINERS. EVACUATE TO A RADIUS OF 5000 FEET FOR UNCONTROLLABLE FIRE.

WATER MAY BE INEFFECTIVE (NFFA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1984)

TRANSPORTATION

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49 CFR 172.101:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49 CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.124
EXCEPTIONS: NONE

TOXICITY

ETHYLENE OXIDE:

IRRITATION DATA: 1 $\frac{1}{2}$ /7 SECONDS SKIN-HUMAN; 18 MG/6 HOURS EYE-RABBIT MODERATE.

TOXICITY DATA: 12500 PPM/10 SECONDS INHALATION-HUMAN TCLO; 500 PPM/2 MINUTES

INHALATION-WOMAN TCLO; 800 PPM/4 HOURS INHALATION-RAT LC50; 72 MG/KG

ORAL-RAT LD50; 836 PPM/4 HOURS INHALATION-MOUSE LC50; 175 MG/KG

INTRAVENOUS-RABBIT LDLO; 960 PPM/4 HOURS INHALATION-DOG LC50; 1500 MG/M3/4

HOURS INHALATION-GUINEA PIG LC50; 270 MG/KG ORAL-GUINEA PIG LD50; 290 MG/KG

INTRAVENOUS-MOUSE LD50; 175 MG/KG INTRAPERITONEAL-MOUSE LD50; 187 MG/KG

SUBCUTANEOUS-RAT LD50; 100 MG/KG SUBCUTANEOUS-CAT LDLO; 200 MG/KG UNREPORTED

ROUTE-RAT LDLO; 330 MG/KG INTRAVENOUS-DOG LD50; MUTAGENIC DATA (RTECS);

REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: OSHA CARCINOGEN; ANTICIPATED HUMAN CARCINOGEN (NTP);

HUMAN LIMITED EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-2A). SEVERAL

EPIDEMIOLOGICAL STUDIES INDICATE THERE IS A CAUSAL RELATIONSHIP BETWEEN

EXPOSURE TO ETHYLENE OXIDE AND AN INCREASED INCIDENCE OF LEUKEMIA. HOWEVER

THESE STUDIES SUFFER FROM DISADVANTAGES, ESPECIALLY CONFOUNDING EXPOSURES,

WHICH MAKE THEIR INTERPRETATION DIFFICULT. IN RATS GASTRIC INTUBATION

PRODUCED DOSE-DEPENDENT LOCAL TUMORS, MAINLY SQUAMOUS-CELL CARCINOMAS OF THE

FORESTOMACH. INHALATION EXPOSURE PRODUCED AN INCREASED INCIDENCE OF

MONONUCLEAR-CELL LEUKEMIA IN BOTH SEXES OF RATS AND PERITONEAL

MESOTHELIOMAS, GLIOMAS OF THE BRAIN, AND A HIGH INCIDENCE OF PROLIFERATIVE

LESIONS OF THE ADRENAL CORTEX IN MALES. SUBCUTANEOUS INJECTION IN MICE

PRODUCED LOCAL TUMORS IN A DOSE-DEPENDENT MANNER. NTP TR-326 REPORTS

CLEAR EVIDENCE OF CARCINOGENIC ACTIVITY FOR MICE AS INDICATED BY

DOSE-RELATED INCREASED INCIDENCES OF BENIGN OR MALIGNANT NEOPLASMS OF THE

LUNGS IN BOTH SEXES OF MICE FOLLOWING INHALATION EXPOSURE.

ADDITIONALLY, MALIGNANT NEOPLASMS OF THE UTERUS, MAMMARY GLAND, AND

HEMATOPOIETIC SYSTEM (LYMPHOMA) WERE REPORTED IN FEMALES.

LOCAL EFFECTS: IRRITANT- MUCOUS MEMBRANES; CORROSIVE- SKIN, EYES.

ACUTE TOXICITY LEVEL: TOXIC BY INHALATION AND INGESTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; SENSITIZER- SKIN; POISONING
MAY AFFECT THE LIVER, KIDNEYS, BLOOD, RESPIRATORY SYSTEM AND REPRODUCTIVE
SYSTEM.

ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

ETHYLENE OXIDE:

IRRITANT/NARCOTIC/CARCINOGEN/TOXIC.

ACUTE EXPOSURE-- HIGH LEVELS MAY CAUSE ANOSMIA, MUCOUS MEMBRANE IRRITATION LEADING TO EMPHYSEMA AND BRONCHITIS, SEVERE COUGH, AND A SWEETISH TASTE IN THE MOUTH. VOMITING, RECURRING PERIODICALLY FOR HOURS, ACCOMPANIED BY NAUSEA AND HEADACHE IS COMMON. DELAYED CENTRAL NERVOUS SYSTEM DEPRESSION MAY OCCUR WITH DYSPNEA, CYANOSIS, DROWSINESS, WEAKNESS, INCOORDINATION, DISORIENTATION AND UNCONSCIOUSNESS. BRADYCARDIA, APHONIA, KIDNEY DAMAGE, PULMONARY EDEMA AND DEATH MAY ALSO OCCUR. STUDIES SUGGEST THAT BLOOD CELL CHANGES, AN INCREASE IN CHROMOSOMAL ABERRATIONS, AND SPONTANEOUS ABORTION MAY ALSO BE CAUSALLY RELATED TO ACUTE OVEREXPOSURE TO ETHYLENE OXIDE. EXPOSURE OF ANIMALS TO GREATER THAN 1000 PPM/2 HOURS CAUSED LACRIMATION AND NASAL DISCHARGE, FOLLOWED BY GASPING AND LABORED BREATHING. DELAYED EFFECTS WERE VOMITING, DIARRHEA, DYSPNEA, PULMONARY EDEMA, PARALYSIS OF HIND QUARTERS, CONVULSIONS AND DEATH. AUTOPSY REVEALED INJURY TO LUNGS, LIVER AND KIDNEYS. PROMPT DEATHS WERE DUE TO EDEMA, WHILE DELAYED DEATHS RESULTED FROM SECONDARY INFECTION OF THE LUNGS. A STATISTICALLY SIGNIFICANT INCREASE IN EMBRYOLETHALITY, DUE TO DOMINANT LETHAL EFFECTS, WAS REPORTED IN MICE FOLLOWING A SINGLE EXPOSURE OF MALES PRIOR TO MATING.

CHRONIC EXPOSURE-- WORKERS EXPOSED TO GREATER THAN 700 PPM INTERMITTENTLY FOR 2 MONTHS REPORTED MUCOSAL IRRITATION, TRANSIENT BLUNTING OF THE SENSES OF SMELL AND TASTE, HEADACHE, NAUSEA, VOMITING, LETHARGY, NUMBNESS AND WEAKNESS IN THE EXTREMITIES, MEMORY/THINKING DISTURBANCES, SLURRED SPEECH, DIFFICULTY SWALLOWING, FACIAL WEAKNESS, AND RECURRENT MAJOR MOTOR SEIZURES. NEUROLOGICAL EXAMINATION RESULTS WERE CONSISTENT WITH SENSORIMOTOR NEUROPATHY. IMPROVEMENT OCCURRED 2 WEEKS AFTER REMOVAL FROM EXPOSURE. AN INCREASE IN SISTER CHROMATID EXCHANGES, CHROMOSOMAL ABERRATIONS OF PERIPHERAL LYMPHOCYTES, REDUCED HEMOGLOBIN AND ELEVATED LYMPHOCYTES HAVE BEEN REPORTED IN PRODUCTION PLANT WORKERS. A FINNISH STUDY SUGGESTS EXPOSURE TO ETHYLENE OXIDE MAY BE RELATED TO AN INCREASE IN SPONTANEOUS ABORTIONS AMONG HOSPITAL STERILIZING STAFF. STUDIES OF PRODUCTION WORKERS EXPOSED TO ETHYLENE OXIDE AND OTHER CHEMICALS INDICATE A SIGNIFICANT EXCESS OF MORTALITY AND CANCER THAT INCLUDED LEUKEMIA, HODGKINS DISEASE, AND GASTROINTESTINAL AND UROGENITAL TRACT MALIGNANCIES AS WELL AS AN INCREASE IN DISEASES OF THE CIRCULATORY SYSTEM. CHRONIC EXPOSURE OF TEST ANIMALS TO 100 PPM RESULTED IN A LONGER GESTATION PERIOD, REDUCED FERTILITY INDEX, AND FEWER PUPS. OTHER ANIMAL STUDIES REPORT DOMINANT LETHAL EFFECTS, AND VARIABLE EFFECTS ON THE TESTES INCLUDING SLIGHT DECREASE IN WEIGHT, APPRECIABLE DEGENERATION AND REPLACEMENT FIBROSIS. INHALATION STUDIES IN RATS SHOWED EXPOSURE CAUSED AN INCREASED INCIDENCE OF MONONUCLEAR-CELL LEUKEMIA IN BOTH SEXES AND PERITONEAL MESOTHELIOMAS, GLIOMAS OF THE BRAIN, AND A HIGH INCIDENCE OF PROLIFERATIVE LESIONS OF THE ADRENAL CORTEX IN THE MALES. DOSE-RELATED INCREASED INCIDENCES OF BENIGN OR MALIGNANT NEOPLASMS OF THE LUNG AND BENIGN NEOPLASMS OF THE HARDERIAN GLAND IN MICE WERE REPORTED FOLLOWING EXPOSURE FOR TWO YEARS TO 5 AND 100 PPM ETHYLENE OXIDE. IN FEMALE MICE ADDITIONAL MALIGNANT NEOPLASMS OF THE UTERUS, MAMMARY GLAND AND HEMATOPOIETIC SYSTEM WERE REPORTED. OTHER EFFECTS REPORTED IN ANIMAL STUDIES INCLUDE GROWTH DEPRESSION, NASAL DISCHARGE, DIARRHEA, RESPIRATORY IRRITATION, FLACCID PARALYSIS OF HINDQUARTERS ACCOMPANIED BY SEVERE ATROPHY OF THE MUSCULATURE OF THE HIND LEGS AND BACK.

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:
ETHYLENE OXIDE:
CORROSIVE/SENSITIZER.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE MILD TO SEVERE IRRITATION DEPENDING ON THE CIRCUMSTANCES. SMALL AMOUNTS OF FULL CONCENTRATION WHICH ARE ALLOWED TO EVAPORATE MAY CAUSE NO ADVERSE EFFECTS, WHILE SMALL DILUTE AMOUNTS CONFINED TO THE SKIN BY WAY OF CLOTHING, GLOVES, OR SHOES HAVE BEEN REPORTED TO CAUSE EDEMA AND ERYTHEMA IN 1-6 HOURS, PROGRESSING TO VESICULATION WITH A TENDENCY TO COALESCE INTO BLEBS AND DESQUAMATION. THESE EFFECTS SEEM TO BE REVERSIBLE AND RECOVERY MAY BE COMPLETE WITHIN 3 WEEKS WITH ONLY RESIDUAL BROWN PIGMENTATION. LARGE AMOUNTS WHICH ARE SPILLED ON THE SKIN AND ALLOWED TO EVAPORATE RAPIDLY MAY CAUSE FROSTBITE. SENSITIZATION DERMATITIS MAY OCCUR IN PREVIOUSLY EXPOSED INDIVIDUALS. CHRONIC EXPOSURE- MAY CAUSE DERMATITIS OR EFFECTS SIMILAR TO THOSE IN ACUTE EXPOSURE. SKIN SENSITIZATION HAS BEEN ASSOCIATED WITH REPEATED DERMAL CONTACT.

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.

IN CASE OF FROSTBITE, WARM AFFECTED SKIN IN WARM WATER AT A TEMPERATURE OF 107 F. IF WARM WATER IS NOT AVAILABLE OR IMPRACTICAL TO USE, GENTLY WRAP AFFECTED PART IN BLANKETS. ENCOURAGE VICTIM TO EXERCISE AFFECTED PART WHILE IT IS BEING WARMED. ALLOW CIRCULATION TO RETURN NATURALLY (MATHESON GAS, 6TH ED.). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
ETHYLENE OXIDE:
CORROSIVE.

ACUTE EXPOSURE- HIGH VAPOR CONCENTRATIONS MAY CAUSE IRRITATION, LACRIMATION, AND CLOUDING OF THE CORNEA. DIRECT CONTACT WITH LIQUID MAY CAUSE BURNS. FROSTBITE MAY OCCUR DUE TO RAPID EVAPORATION. CHRONIC EXPOSURE- MAY CAUSE CONJUNCTIVITIS OR EFFECTS SIMILAR TO THOSE IN ACUTE EXPOSURE.

FIRST AID- IMMEDIATELY WASH THE EYES WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). IF FROSTBITE IS PRESENT, WARM WATER MAY BE PREFERRED. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
ETHYLENE OXIDE:
NARCOTIC/TOXIC/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE SORE THROAT, ABDOMINAL PAIN, PAIN IN THE CHEST, HEADACHE, DIZZINESS, NAUSEA, VOMITING, DIARRHEA, BURNS, CYANOSIS, DROWSINESS, WEAKNESS, INCOORDINATION, UNCONSCIOUSNESS AND POSSIBLY DEATH. FROSTBITE DAMAGE TO THE LIPS, MOUTH, AND MUCOUS MEMBRANES MAY ALSO OCCUR. THE LETHAL DOSE IN RATS WAS 72 MG/KG.

CHRONIC EXPOSURE- IN ANIMALS PROLONGED INGESTION CAUSED LOSS OF BODY WEIGHT, GASTRIC IRRITATION, AND SLIGHT LIVER DAMAGE. RATS ADMINISTERED ETHYLENE OXIDE BY GASTRIC INTUBATION HAVE SHOWN AN INCREASED INCIDENCE OF SQUAMOUS-CELL CARCINOMAS OF THE FORESTOMACH, IN A DOSE-DEPENDENT MANNER. WHEN RATS WERE FED DIETS FUMIGATED WITH ETHYLENE OXIDE, NO INCREASED INCIDENCE OF TUMORS WAS OBSERVED.

FIRST AID- IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC FOLLOWED BY WATER. (IF VOMITING OCCURS KEEP THE HEAD

BELOW THE HIPS TO PREVENT ASPIRATION). REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. GIVE ACTIVATED CHARCOAL. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY SECTION

REACTIVITY:

ETHYLENE OXIDE:

DECOMPOSES VIOLENTLY ABOVE 800 F, AND MAY BE READILY INITIATED INTO EXPLOSIVE DECOMPOSITION IN ABSENCE OF AIR.

INCOMPATIBILITIES:

ETHYLENE OXIDE:

ACIDS: EXOTHERMIC POLYMERIZATION.
ALCOHOLS: POSSIBLE EXPLOSION.
ALKALI METAL HYDROXIDES: VIOLENT POLYMERIZATION REACTION.
ALKANETHIOLS: MAY REACT VIOLENTLY UNDER PRESSURE.
ALUMINUM CHLORIDE: EXOTHERMIC POLYMERIZATION.
ALUMINUM OXIDE: VIOLENT POLYMERIZATION.
AMINES: POSSIBLE EXPLOSIVE POLYMERIZATION.
AMMONIA: VIOLENT POLYMERIZATION.
BROMOETHANE: INCOMPATIBLE.
COPPER AND ALLOYS: POSSIBLE EXPLOSION IF TRACES OF ACETYLENE ARE PRESENT.
GLYCEROL: VIOLENT CONDENSATION.
IRON CHLORIDES: VIOLENT POLYMERIZATION.
IRON(III) HEXACYANOFERRATE(4-)("IRON BLUE PIGMENT"): EXOTHERMIC REACTION YIELDING SPONTANEOUSLY COMBUSTIBLE PRODUCT.
IRON OXIDES: VIOLENT POLYMERIZATION.
MAGNESIUM: POSSIBLE EXPLOSION IF TRACES OF ACETYLENE ARE PRESENT.
MAGNESIUM PERCHLORATE: POSSIBLE EXPLOSION.
MERCAPTANS: POSSIBLE EXPLOSION.
MERCURY AND ALLOYS: POSSIBLE EXPLOSION IF TRACES OF ACETYLENE ARE PRESENT.
M-NITROANILINE: POSSIBLE EXPLOSION ON HEATING.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
OXYGEN: POSSIBLE IGNITION IF RAPIDLY COMPRESSED.
PLASTICS, RUBBER, COATINGS: MAY BE ATTACKED.
POTASSIUM: EXPLOSIVE REACTION.
RUST: EXPLOSIVE POLYMERIZATION.
SILVER AND ALLOYS: POSSIBLE EXPLOSION IF TRACES OF ACETYLENE ARE PRESENT.
SODIUM HYDROXIDE: EXOTHERMIC POLYMERIZATION.
SUCROGLYCERIDE: EXOTHERMIC REACTION WHEN HEATED.
TIN CHLORIDES: VIOLENT POLYMERIZATION.
TRIMETHYLAMINE: EXOTHERMIC POLYMERIZATION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:

ETHYLENE OXIDE:

MAY POLYMERIZE VIOLENTLY WHEN EXPOSED TO HEAT OR FLAME, OR WHEN CATALYZED BY ACIDS, ALKALIES, METAL OXIDES, METAL CHLORIDES OR SOME ACTIVE METALS.

STORAGE-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 IN ACCORDANCE WITH 29 CFR 1910.106.

PROTECT AGAINST PHYSICAL DAMAGE. SHOULD BE KEPT COOL, BELOW 86 F. SHOULD BE STORED OUTSIDE, AWAY FROM BUILDINGS AND OTHER MATERIALS, IN INSULATED TANKS OR CONTAINERS, SHIELDED FROM SUN-HEAT, PROVIDED WITH COOLING FACILITIES AND PROTECTED BY A PROPERLY DESIGNED WATER-SPRAY SYSTEM. ADEQUATE DIKING AND DRAINAGE SHOULD BE PROVIDED IN TANK AREA TO CONFINE AND DISPOSE OF LIQUID IN CASE OF TANK RUPTURE. AVOID PITS AND DEPRESSIONS. INSIDE STORAGE SHOULD BE HELD TO A MINIMUM AND CONFINED TO A STANDARD FIRE-RESISTIVE FLAMMABLE LIQUIDS STORAGE ROOM, PROVIDED WITH CONTINUOUS VENTILATION AND FREE OF SOURCES OF IGNITION. DO NOT PERMIT CHLORIDES, OXIDES, ACIDS, ORGANIC BASES, ALKALI METAL HYDROXIDES, METALLIC POTASSIUM OR OTHER COMBUSTIBLE MATERIALS IN STORAGE ROOM (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN NFPA 77-1983, RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

****DISPOSAL****

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U115.

CONDITIONS TO AVOID

EXTREMELY FLAMMABLE; MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. VAPORS MAY TRAVEL TO A SOURCE OF IGNITION AND FLASH BACK. CONTAINER MAY EXPLODE IN HEAT OF FIRE.

SPILLS AND LEAKS

WATER-SPILL:

THE CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) PROHIBITS CONTAMINATING ANY KNOWN SOURCE OF DRINKING WATER WITH SUBSTANCES KNOWN TO CAUSE CANCER AND/OR REPRODUCTIVE TOXICITY.

OCCUPATIONAL-SPILL:

SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT GET WATER INSIDE CONTAINER. FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE SPILL FOR DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY. EVACUATE AREA ENDANGERED BY GAS.

REPORTABLE QUANTITY (RQ):

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY ESTABLISHED FOR THAT 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 SECTION

VENTILATION:

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

ETHYLENE OXIDE:

VENTILATION SHOULD MEET THE REQUIREMENTS IN 29 CFR 1910.1047(F).

RESPIRATOR:

THE FOLLOWING RESPIRATORS ARE THE MINIMUM LEGAL REQUIREMENTS AS SET FORTH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION FOUND IN 29 CFR 1910, SUBPART Z.

MINIMUM REQUIREMENTS FOR RESPIRATORY PROTECTION FOR AIRBORNE ETHYLENE OXIDE (ETO)

CONDITION OF USE OR CONCENTRATION OF ETO (PPM)

MINIMUM REQUIRED RESPIRATOR

EQUAL TO OR LESS THAN 50

FULL FACEPIECE RESPIRATOR WITH ETO APPROVED CANISTER, FRONT OR BACK-MOUNTED.

EQUAL TO OR LESS THAN 2000

POSITIVE-PRESSURE SUPPLIED AIR RESPIRATOR, EQUIPPED WITH FULL FACEPIECE, HELMET OR HOOD;
OR
CONTINUOUS FLOW SUPPLIED-AIR RESPIRATOR (POSITIVE PRESSURE) EQUIPPED WITH FULL FACEPIECE, HELMET OR HOOD;

OR
CONTINUOUS FLOW SUPPLIED-AIR

RESPIRATOR (POSITIVE PRESSURE)
EQUIPPED WITH HELMET, HOOD OR
SUIT.

CONCENTRATIONS ABOVE 2000 OR UNKNOWN
CONCENTRATIONS (SUCH AS IN EMERGENCIES).

POSITIVE PRESSURE SELF-CONTAINED
BREATHING APPARATUS EQUIPPED WITH
A FULL FACEPIECE;

OR

POSITIVE-PRESSURE FULL FACEPIECE
SUPPLIED AIR RESPIRATOR EQUIPPED
WITH AN AUXILIARY POSITIVE
PRESSURE SELF-CONTAINED BREATHING
APPARATUS.

FIREFIGHTING

POSITIVE PRESSURE SELF-CONTAINED
BREATHING APPARATUS WITH A FULL
FACEPIECE.

ESCAPE

ANY RESPIRATOR DESCRIBED ABOVE.

(RESPIRATORS APPROVED FOR USE IN HIGHER CONCENTRATIONS ARE PERMITTED TO BE
USED IN LOWER CONCENTRATIONS).

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS
BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO
CHEMICAL HAZARDS OR NIOSH CRITERIA DOCUMENTS.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND
IN THE WORK PLACE AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE OF
OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION.

ETHYLENE OXIDE (AT ANY DETECTABLE CONCENTRATION):

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN
PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE OPERATED IN
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.

ESCAPE- AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE
OR FRONT- OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST
ETHYLENE OXIDE.

ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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

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

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN 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:

WEAR IMPERVIOUS CLOTHING TO PREVENT CONTACT WITH THE GAS FORM. IF CONTACT WITH
THE LIQUIFIED GAS IS POSSIBLE, EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE
CLOTHING AND EQUIPMENT TO PREVENT SKIN FROM FREEZING.

AVOID ANY POSSIBILITY OF SKIN CONTACT WITH LIQUID ETHYLENE OXIDE OR SOLUTIONS

OF ETHYLENE OXIDE.

ETHYLENE OXIDE:

PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29 CFR 1910.1047(G).

GLOVES:

FOR GAS: WEAR IMPERVIOUS GLOVES. SPECIFIC TYPE OF GLOVE MAY BE TESTED AND/OR RECOMMENDED BY MANUFACTURER.

FOR COMPRESSED LIQUID: WEAR FULL PROTECTIVE, COLD INSULATING GLOVES.

ETHYLENE OXIDE:

PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29 CFR 1910.1047(G)(4).

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.

ETHYLENE OXIDE:

PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE CLOTHING AND EQUIPMENT IN 29 CFR 1910.1047(G).

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