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MERCAPTOETHANOL
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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

SUBSTANCE: **MERCAPTOETHANOL**
CAS-NUMBER 60-24-2

TRADE NAMES/SYNONYMS:

BETA-MERCAPTOETHANOL; 2-MERCAPTOETHANOL; MONOTHIOETHYLENE GLYCOL;
2-HYDROXYETHYL MERCAPTAN; THIOGLYCOL; BETA-HYDROXYETHANETHIOL;
THIOMONOGLYCOL; 2-HYDROXYETHANETHIOL; O3446; BP176; ETHANOL, 2-MERCAPTO-
BETA-HYDROXYETHYL MERCAPTAN; HYDROXYETHYL MERCAPTAN; 2-ME; MONOTHIOGLYCOL;
2-MERCAPTOETHYL ALCOHOL; THIOETHYLENE GLYCOL; 2-HYDROXY-1-ETHANETHIOL;
UN 2966; C2H6OS; ACC13740

CHEMICAL FAMILY:
THIOL (MERCAPTAN)

HYDROXYL, ALIPHATIC

MOLECULAR FORMULA: H-S-C-H2-C-H2-O-H

MOLECULAR WEIGHT: 78.13

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=2 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=2 REACTIVITY=U

COMPONENTS AND CONTAMINANTS

COMPONENT: MERCAPTOETHANOL
CAS# 60-24-2 PERCENT: 100.0

OTHER CONTAMINANTS: NONE

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

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS, MOBILE LIQUID, WITH A STRONG, DISAGREEABLE,

CHARACTERISTIC ODOR. BOILING POINT: 315 F (157 C) @ 742 MMHG (DECOMPOSE)

MELTING POINT: -148 F (-100 C) SPECIFIC GRAVITY: 1.114

VOLATILITY: 100% @ 21 C VAPOR PRESSURE: 1 MMHG @ 20 C

EVAPORATION RATE: NOT AVAILABLE PH: 5.2 (0.1M SOLUTION)

SOLUBILITY IN WATER: SOLUBLE ODOR THRESHOLD: 0.12-345 PPM

VAPOR DENSITY: 2.69

SOLVENT SOLUBILITY: SOLUBLE IN ETHANOL, ETHER, BENZENE, MOST ORGANIC SOLVENTS.

VISCOSITY: 3.43 CP @ 20 C REFRACTIVE INDEX: 1.4996 @ 20 C
SATURATED VAPOR CONC: 81600 PPM (8.2%) @ 20 C ACIDITY: PKA= 9.43-9.7

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
MODERATE 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 ABOVE FLASH POINT.

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FLASH POINT: 165 F (74 C) (COC) UPPER EXPLOSIVE LIMIT: 18%

LOWER EXPLOSIVE LIMIT: 2.3% AUTOIGNITION TEMP.: 563 F (295 C)

FLAMMABILITY CLASS(OSHA): IIIA

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).

ALCOHOL FOAM
(NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. COOL CONTAINER WITH WATER USING UNMANNED DEVICE UNTIL WELL AFTER FIRE IS OUT. FIGHT FIRE FROM MAXIMUM DISTANCE. STAY AWAY FROM ENDS OF TANKS. DIKE FIRE. CONTROL WATER FOR LATER DISPOSAL; DO NOT SCATTER MATERIAL. (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 57).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE FLOODING AMOUNTS OF WATER AS A FOG; SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING POISONOUS VAPORS. KEEP UPWIND.

TRANSPORTATION DATA

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

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

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49-CFR 173.346
EXCEPTIONS: 49-CFR 173.345

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:
THIOGLYCOL-UN 2966

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
6.1 - POISONOUS MATERIALS

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

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

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: NONE
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.243

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L

TOXICITY

MERCAPTOETHANOL:
IRRITATION DATA: 10 MG/24 HOURS OPEN SKIN-RABBIT; 2280 MG EYE-RABBIT SEVERE.
TOXICITY DATA: 13200 MG/M3 INHALATION-MOUSE LC50; 150 MG/KG SKIN-RABBIT LD50;
300 MG/KG SKIN-GUINEA PIG LD50; 244 MG/KG ORAL-RAT LD50; 190 MG/KG
ORAL-MOUSE LD50; 200 MG/KG INTRAPERITONEAL-MOUSE LD50; 480 MG/KG
UNREPORTED-MOUSE LD50; MUTAGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT - INHALATION, SKIN, EYE.
ACUTE TOXICITY LEVEL: HIGHLY TOXIC BY DERMAL ABSORPTION; TOXIC BY INHALATION,
INGESTION.
TARGET EFFECTS: POISONING MAY AFFECT THE CENTRAL NERVOUS SYSTEM.

HEALTH EFFECTS AND FIRST AID

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**INHALATION:
 MERCAPTOETHANOL:
 IRRITANT/TOXIC.**

ACUTE EXPOSURE- EXPOSURE MAY CAUSE SLIGHT TO SEVERE IRRITATION OF THE RESPIRATORY TRACT DEPENDING ON VAPOR CONCENTRATION. A LOW CONCENTRATION MAY ALSO CAUSE HEADACHE AND NAUSEA. A HIGH CONCENTRATION MAY CAUSE COUGHING, WHEEZING, SHORTNESS OF BREATH, A BURNING SENSATION, LARYNGITIS, AND VOMITING. A MASSIVE EXPOSURE MAY BE FATAL. IN A STUDY INVOLVING RATS, THE MAXIMUM TIME FOR NO DEATHS TO OCCUR FROM INHALATION OF MERCAPTOETHANOL SATURATED VAPOR WAS 4 HOURS. BASED ON GENERAL INFORMATION ON THE THIOL GROUP, MERCAPTOETHANOL MAY ALSO CAUSE DIARRHEA, DIZZINESS, MUSCLE WEAKNESS, TREMORS, NARCOSIS, UNCONSCIOUSNESS, CYANOSIS, COLD EXTREMITIES, RAPID PULSE, DYSPNEA, FEVER, IRREVERSIBLE DEPRESSION OF CEREBRAL FUNCTION, CONVULSIONS, RESPIRATORY PARALYSIS, COMA, DELAYED PULMONARY EDEMA, AND RENAL DAMAGE WITH HEMATURIA, ALBUMINURIA, AND CASTS IN URINE. HEPATIC DAMAGE, HEMOLYTIC ANEMIA AND METHEMOGLOBINEMIA HAS ALSO BEEN REPORTED. IN AN INDUSTRIAL ACCIDENT A MAN EXPOSED TO UNDETERMINED QUANTITY AND KINDS OF THIOLS FOR AN ESTIMATED 2 HOURS, WAS FOUND UNCONSCIOUS AND DEEPLY CYANOTIC. TWO WEEKS LATER HE DEVELOPED A LUNG ABSCESS. EXPOSED EXPERIMENTAL ANIMALS HAVE COMMONLY SHOWN LATENT PULMONARY INFECTION AND/OR PNEUMONIA.
 CHRONIC EXPOSURE- CENTRAL NERVOUS SYSTEM STIMULATION HAS BEEN SHOWN IN ANIMALS.

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:
 MERCAPTOETHANOL:
 IRRITANT/HIGHLY TOXIC.**

ACUTE EXPOSURE- MAY CAUSE REDNESS, PAIN, MODERATE ERYTHEMA OR EDEMA. CONCENTRATED VAPOR OR LIQUID CAN CAUSE SEVERE IRRITATION AND CAN POSSIBLY BE DESTRUCTIVE TO SKIN. ABSORPTION MAY CAUSE SYMPTOMS AS DETAILED IN ACUTE INHALATION.
 CHRONIC EXPOSURE- CAN CAUSE CONTACT DERMATITIS. MERCAPTOETHANOL HAS BEEN REPORTED TO CAUSE CENTRAL NERVOUS SYSTEM STIMULATION IN ANIMALS.

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:
 MERCAPTOETHANOL:
 IRRITANT.**

ACUTE EXPOSURE- MAY CAUSE WATERING OF EYES, SNEEZING, REDNESS, AND PAIN. CONCENTRATED VAPOR OR LIQUID MAY CAUSE SEVERE IRRITATION AND CAN BE EXTREMELY DESTRUCTIVE TO THE EYE. IN A STUDY USING RABBITS, 10 MG OF UNDILUTED MERCAPTOETHANOL AFFECTED THE CONJUNCTIVA AND CAUSED LONG-LASTING MODERATELY SEVERE CORNEAL OPACITY.
 CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT WITH IRRITANTS MAY CAUSE CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

**INGESTION:
 MERCAPTOETHANOL:
 TOXIC.**

ACUTE EXPOSURE- MAY CAUSE IRRITATION OF THE GASTROINTESTINAL TRACT WITH SORE THROAT, LARYNGITIS, A BURNING SENSATION, COUGHING, WHEEZING, SHORTNESS OF BREATH, HEADACHE, ABDOMINAL PAIN, NAUSEA AND VOMITING. MASSIVE EXPOSURE MAY BE FATAL. DOSES OF LESS THAN 480 MG/KG IN MICE CAUSED SLOWED AND DEEPENED RESPIRATION, RETARDED STIMULI RESPONSE, COMA, AND DEATH IN 1-3 DAYS. DOSES OF 480 MG/KG AND GREATER CAUSED INTERMITTENT TREMORS, REDUCED MUSCULAR COORDINATION, LONG DURATION CLONIC CONVULSIONS, SALIVATION, URINATION AND DEATH IN 1-2 HOURS. BASED ON GROUP INFORMATION ON THIOLS OTHER SYMPTOMS MAY OCCUR AS DETAILED IN ACUTE INHALATION.
 CHRONIC EXPOSURE- BASED ON ANIMAL DATA, MAY CAUSE CENTRAL NERVOUS SYSTEM STIMULATION.

FIRST AID- IF EXTENSIVE VOMITING HAS NOT OCCURRED, THE SUBSTANCE SHOULD BE REMOVED BY EMESIS OR GASTRIC LAVAGE PROVIDED THAT THE PATIENT IS CONSCIOUS AND CONVULSIONS ARE NOT PRESENT. KEEP HEAD BELOW HIPS DURING VOMITING TO PREVENT ASPIRATION. DO NOT ATTEMPT TO MAKE AN UNCONSCIOUS PERSON VOMIT. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY (DREIBACH, HANDBOOK OF POISONING, 12TH ED.). TREATMENT SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL.

ANTIDOTE:
 THE FOLLOWING ANTIDOTE HAS BEEN RECOMMENDED. HOWEVER, THE DECISION AS TO

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WHETHER THE SEVERITY OF POISONING REQUIRES ADMINISTRATION OF ANY ANTIDOTE AND ACTUAL DOSE REQUIRED SHOULD BE MADE BY QUALIFIED MEDICAL PERSONNEL.

FOR SULFIDE AND MERCAPTAN POISONING:
 IN SEVERE POISONINGS TREAT WITH AMYL NITRITE (AMYL NITRITE PERLES) BY INHALATION FOR 15 TO 30 SECONDS OF EVERY MINUTE, WHILE SODIUM NITRITE SOLUTION IS BEING PREPARED. DISCONTINUE AMYL NITRITE AND IMMEDIATELY INJECT 10 ML OF A 3% SOLUTION SODIUM NITRITE INTRAVENOUSLY OVER A PERIOD OF 2 TO 4 MINUTES. IF NECESSARY, INJECT A NON-STERILE SOLUTION. DO NOT REMOVE THE NEEDLE.
 CAUTION: APPROPRIATE ADJUSTMENTS IN THE DOSE SHOULD BE MADE ON A BODY WEIGHT BASIS. OXYGEN THERAPY MAY BE OF VALUE IN COMBINATION WITH NITRITE THERAPY (GOSSELIN, SMITH, HODGE, CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 5TH ED.). PYRIDOXINE, 25 MG/KG INTRAVENOUSLY, OR 10% UREA, 1 GM/KG INTRAVENOUSLY, HAS BEEN SUGGESTED AS A SULFIDE ACCEPTOR (DREIBACH, HANDBOOK OF POISONING, 12TH ED.). ANTIDOTE SHOULD BE ADMINISTERED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

 REACTIVITY

REACTIVITY:
 MAY REACT WITH WATER OR STEAM TO PRODUCE TOXIC AND FLAMMABLE VAPORS.

INCOMPATIBILITIES:
 MERCAPTOETHANOL:

ACIDS (STRONG): FLAMMABLE AND TOXIC VAPORS.
 ALCOHOLS: INCOMPATIBLE.
 ALKALI METALS: VIGOROUS OR VIOLENT REACTION.
 BASES (STRONG): VIGOROUS REACTION.
 CALCIUM HYPOCHLORITE: VIOLENT REACTION, POSSIBLE FIRE.
 NITRIC ACID: VIGOROUS REACTION, POSSIBLE FIRE.
 OXIDIZERS (STRONG): VIOLENT REACTION, POSSIBLE FIRE.
 REDUCING AGENTS: VIGOROUS REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HIGHLY TOXIC FUMES OF HYDROGEN SULFIDE AND TOXIC OXIDES OF SULFUR AND CARBON.

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 IN ACCORDANCE WITH 29 CFR 1910.106.

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.

 CONDITIONS TO AVOID

MAY BE IGNITED BY HEAT, SPARKS OR FLAMES. CONTAINER MAY EXPLODE IN HEAT OF FIRE. VAPOR EXPLOSION AND POISON HAZARD INDOORS, OUTDOORS OR IN SEWERS.

 SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:

SHUT OFF IGNITION SOURCES. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. 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 CONTAINERS AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

 PROTECTIVE EQUIPMENT

VENTILATION:
 PROCESS ENCLOSURE RECOMMENDED. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

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

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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 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 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.

AUTHORIZED - FISHER SCIENTIFIC, INC.

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