

DATE: 08/14/93
INDEX: N/AACCT: 888235-01
CAT NO: A3971

PO NBR: N/A

BUTANOL-ISO
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MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

SUBSTANCE: **BUTANOL-ISO**
CAS-NUMBER 78-83-1TRADE NAMES/SYNONYMS:
ISOBUTANOL; FERMENTATION BUTYL ALCOHOL; ISOPROPYLCARBINOL;
2-METHYLPROPYL ALCOHOL; 1-HYDROXYMETHYLPROPANE; 2-METHYL-1-PROPANOL;
2-METHYLPROPAN-1-OL; ISO-BUTYL ALCOHOL; 1-PROPANOL; 2-METHYL-; U140;
STCC 4909131; UN 1212; ISOBUTYL ALCOHOL; A-424; A-397; A-379; C4H10O;
ACCI1640CHEMICAL FAMILY:
HYDROXYL, ALIPHATIC

MOLECULAR FORMULA: (C-H3)2-C-H-C-H2-O-H

MOLECULAR WEIGHT: 74.12

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

COMPONENTS AND CONTAMINANTS

COMPONENT: BUTANOL-ISO PERCENT: 100
CAS# 78-83-1

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
ISOBUTYL ALCOHOL:
50 PPM (152 MG/M3) OSHA TWA
50 PPM (152 MG/M3) ACGIH TWA
50 PPM (152 MG/M3) NIOSH RECOMMENDED TWAMEASUREMENT METHOD: CHARCOAL TUBE; 2-PROPANOL/CARBON DISULFIDE; GAS
CHROMATOGRAPHY WITH FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1401,
ALCOHOLS, II).

5000 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: COLORLESS, VOLATILE LIQUID WITH A MILD, SWEET, NON-RESIDUAL ODOR

BOILING POINT: 226 F (108 C) MELTING POINT: -162 F (-108 C)

SPECIFIC GRAVITY: 0.8018 VISCOSITY: 4 CP @ 20C

VAPOR PRESSURE: 8.8 MMHG @ 20 C EVAPORATION RATE: (BUTYL ACETONE=1) 0.8

SOLUBILITY IN WATER: 8.5% ODOR THRESHOLD: 0.003 PPM VAPOR DENSITY: 2.6

SOLVENT SOLUBILITY: ALCOHOL, ETHER, ACETONE

FIRE AND EXPLOSION DATA

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

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE

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OF IGNITION AND FLASH BACK.

FLASH POINT: 82 F (28 C) (CC) UPPER EXPLOSIVE LIMIT: 10.6% @ 202 F

LOWER EXPLOSIVE LIMIT: 1.7% @ 123 F AUTOIGNITION TEMP.: 780 F (415 C)

FLAMMABILITY CLASS(OSHA): IB

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).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. APPLY COOLING
WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE
IS OUT. 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
1/2 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 26).EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE WATER IN FLOODING AMOUNTS AS A
FOG, SOLID STREAMS MAY NOT BE EFFECTIVE. COOL CONTAINERS WITH FLOODING
AMOUNTS OF WATER; APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING
TOXIC VAPORS, KEEP UPWIND.WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE
LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49-CFR 172.101:
FLAMMABLE LIQUIDDEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49-CFR 172.101 AND
SUBPART E:
FLAMMABLE LIQUIDDEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49-CFR 173.125
EXCEPTIONS: 49-CFR 173.118FINAL 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:
ISOBUTYL ALCOHOL-UN 1212U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
3 - FLAMMABLE LIQUIDU.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG IIIU.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUIDU.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.203
BULK PACKAGING: 49 CFR 173.241U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 60 L
CARGO AIRCRAFT ONLY: 220 L

TOXICITY

ISOBUTYL ALCOHOL (BUTANOL-ISO):
IRRITATION DATA: 20 MG/24 HOURS SKIN-RABBIT MODERATE; 2 MG OPEN EYE-RABBIT
SEVERE; 2 MG/24 HOURS EYE-RABBIT SEVERE.
TOXICITY DATA: 3400 MG/KG SKIN-RABBIT LD50; 2460 MG/KG ORAL-RAT LD50;
3750 MG/KG ORAL-RABBIT LDLO; 340 MG/KG INTRAVENOUS-RAT LD50; 417 MG/KG
INTRAVENOUS-MOUSE LD50; 725 MG/KG INTRAVENOUS-CAT LDLO; 720 MG/KG

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INTRAPERITONEAL-RAT LD50: 1801 MG/KG INTRAPERITONEAL-MOUSE LD50:
323 MG/KG INTRAPERITONEAL-RABBIT LD50: 1401 MG/KG INTRAPERITONEAL-HAMSTER
LD50; 1201 MG/KG INTRAPERITONEAL-GUINEA PIG LD50; MUTAGENIC DATA (RTECS);
TUMORIGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: IRRITANT- INHALATION, SKIN, EYE.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION; SLIGHTLY TOXIC BY
DERMAL ABSORPTION.
TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT. POISONING MAY ALSO
AFFECT THE LIVER AND KIDNEYS.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH A HISTORY OF RESPIRATORY OR
SKIN DISEASE.
ADDITIONAL DATA: ALCOHOL MAY ENHANCE THE TOXIC EFFECTS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
ISOBUTYL ALCOHOL (BUTANOL-ISO):
IRRITANT/NARCOTIC. 8000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- INHALATION OF HIGH VAPOR CONCENTRATIONS MAY CAUSE IRRITATION
OF THE RESPIRATORY TRACT WITH SORE THROAT, COUGHING, SHORTNESS OF
BREATH, HEADACHE, NAUSEA, DIZZINESS, DULLNESS, DROWSINESS, NARCOSIS, AND
UNCONSCIOUSNESS. HIGH CONCENTRATIONS HAVE PRODUCED DEATH IN ANIMALS.
CHRONIC EXPOSURE- PROLONGED INHALATION HAS CAUSED AUDITORY NERVE AND
VESTIBULAR INJURY RESULTING IN SEVERE VERTIGO AND HEARING LOSS IN WORKERS
EXPOSED TO ISOBUTYL AND N-BUTYL ALCOHOLS. REPEATED OR
PROLONGED EXPOSURE TO HIGH MIXED VAPOR CONCENTRATIONS OF ISOBUTYL
ALCOHOL AND BUTYL ACETATE RESULTED IN IRRITATION OF MUCOUS MEMBRANES
AND LOSS OF APPETITE AND WEIGHT IN WORKERS. INTERMITTENT EXPOSURE TO
6400 PPM FOR 136 HOURS RESULTED IN NARCOSIS AND SLIGHT ORGANIC CHANGES
IN THE LIVER AND KIDNEYS IN MICE; NO DEATHS WERE REPORTED.

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:

ISOBUTYL ALCOHOL (BUTANOL-ISO):
IRRITANT.
ACUTE EXPOSURE- CONTACT WITH VAPOR OR LIQUID MAY CAUSE MILD TO MODERATE
IRRITATION AND REDNESS. APPLICATION OF THE SUBSTANCE TO HUMAN SKIN CAUSED
SLIGHT ERYTHEMA AND HYPEREMIA, BUT WITHOUT THE FORMATION OF WHEELS.
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT MAY DECREASE THE SKIN
RESULTING IN DRYING, CRACKING, AND ECZEMATOID 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:

ISOBUTYL ALCOHOL (BUTANOL-ISO):
IRRITANT.
ACUTE EXPOSURE- VAPOR CONCENTRATIONS 100 PPM MAY CAUSE IRRITATION,
REDNESS, PAIN, AND BLURRED VISION. APPLICATION OF A DROP IN RABBIT EYES
RESULTED IN MODERATE TO SEVERE IRRITATION THAT WAS GRADED 5-7 ON A
SCALE OF 1-10; NO PERMANENT DAMAGE TO THE CORNEA OCCURRED.
CHRONIC EXPOSURE- REPEATED 8 HOUR EXPOSURE TO 100 PPM INDICATED NO EVIDENCE
OF IRRITATION IN HUMANS. EXPOSURE TO HIGH MIXED VAPOR CONCENTRATIONS OF
ISOBUTYL ALCOHOL AND BUTYL ACETATE RESULTED IN IRRITATION OF THE EYES
AND VACUOLAR KERATITIS IN WORKERS.

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:

ISOBUTYL ALCOHOL (BUTANOL-ISO):
NARCOTIC.
ACUTE EXPOSURE- MAY CAUSE ABDOMINAL PAIN, HEADACHE, NAUSEA, VOMITING,
DIZZINESS, DULLNESS, DROWSINESS, NARCOSIS, AND UNCONSCIOUSNESS.
ADMINISTRATION OF 1.4 G/KG PRODUCED NARCOSIS IN RABBITS.
CHRONIC EXPOSURE- REPEATED GASTRIC INTUBATION RESULTED IN MALIGNANT AND
BENIGN TUMORS IN RATS.

FIRST AID- REMOVE INGESTED MATERIAL BY GASTRIC LAVAGE OR EMESIS. GIVE
ARTIFICIAL RESPIRATION WITH OXYGEN IF RESPIRATION IS DEPRESSED. (DREIBACH
HANDBOOK OF POISONING, 11TH ED.) GET MEDICAL ATTENTION IMMEDIATELY.
ADMINISTRATION OF GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL
PERSONNEL.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

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INCOMPATIBILITIES:

ISOBUTYL ALCOHOL (BUTANOL-ISO):
ALKALI METALS: REACTS WITH FORMATION OF FLAMMABLE HYDROGEN GAS.
ALUMINUM (METALLIC): MAY REACT AT HIGH TEMPERATURES.
OXIDIZERS (STRONG): REACTS WITH FORMATION OF FLAMMABLE HYDROGEN GAS.
PLASTICS, RUBBER, COATINGS: ATTACKED.
SEE ALSO ALCOHOLS.

ALCOHOLS:

ACETALDEHYDE: VIOLENT CONDENSATION REACTION.
BARIUM PERCHLORATE: FORMATION OF HIGHLY EXPLOSIVE PERCHLORIC ESTER ON
REFLUXING.
CHLORINE: FORMATION OF HIGHLY EXPLOSIVE ALKYL HYPOCHLORITES.
DIETHYL ALUMINUM BROMIDE: SPONTANEOUS IGNITION.
ETHYLENE OXIDE: POSSIBLE EXPLOSION.
HEXAMETHYLENE DIISOCYANATE: POSSIBLE EXPLOSION IN ABSENCE OF SOLVENT.
HYDROGEN PEROXIDE + SULFURIC ACID: POSSIBLE EXPLOSION.
HYDROCHLOROUS ACID: FORMATION OF HIGHLY EXPLOSIVE ALKYL HYPOCHLORITES.
ISOCYANATES: POSSIBLE EXPLOSION IN ABSENCE OF SOLVENT.
LITHIUM ALUMINUM HYDRIDE: VIGOROUS REACTION.
NITROGEN Tetroxide: POSSIBLE EXPLOSION.
PERCHLORIC ACID (HOT): DANGEROUS INTERACTION.
PERMONOSULFURIC ACID: POSSIBLE EXPLOSION ON CONTACT WITH PRIMARY OR
SECONDARY ALCOHOLS.
TRI-ISO-BUTYL ALUMINUM: VIOLENT REACTION.

DECOMPOSITION:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF 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.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF
HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS
MAY BE EXPLOSIVE AND POISONOUS; DO NOT ALLOW UNNECESSARY PERSONNEL IN AREA.
DO NOT OVERHEAT CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE AND TRAVEL A
CONSIDERABLE DISTANCE IN HEAT OF FIRE.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL:
SHUT OFF IGNITION SOURCES. 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 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.

REPORTABLE QUANTITY (RQ): 5000 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 TO MEET PUBLISHED EXPOSURE LIMITS.

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VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

RESPIRATOR:

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, NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z. THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

ISOBUTYL ALCOHOL:

500 PPM- ANY SUPPLIED-AIR RESPIRATOR.

ANY SELF-CONTAINED BREATHING APPARATUS.

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).

1000 PPM- ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR

CARTRIDGE(S).

ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ORGANIC VAPOR CARTRIDGE(S).

1250 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

2500 PPM- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A

CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

8000 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A HALF-MASK AND OPERATED IN A

PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A

CHIN-STYLE OR FRONT OR BACK-MOUNTED ORGANIC VAPOR CANISTER.

ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

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 TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

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

AUTHORIZED - FISHER SCIENTIFIC, INC.

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