

DATE: 08/14/93
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BENZENE
BENZENE
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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 71-43-2

SUBSTANCE: **BENZENE**

TRADE NAMES/SYNONYMS:

BENZOL; CYCLOHEXATRIENE; BENZOLE; PHENE; PYROBENZOL; PYROBENZOLE;
CARBON OIL; COAL TAR NAPHTHA; PHENYL HYDRIDE; BENZOLENE;
BICARBURET OF HYDROGEN; COAL NAPHTHA; MOTOR BENZOL; ANNULENE;
(6)ANNULENE; NITRATION BENZENE; MINERAL NAPHTHA;
B426; 13065; B243; B245S; B245; B411; B414; RCRA U019; UN 1114;
STCC 4908110; C6H6; ACC02610

CHEMICAL FAMILY:
HYDROCARBON, AROMATIC

MOLECULAR FORMULA: C6-H6

MOLECULAR WEIGHT: 78.11

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

COMPONENTS AND CONTAMINANTS

COMPONENT: BENZENE PERCENT: 99
CAS# 71-43-2

OTHER CONTAMINANTS: 0.15% NON-AROMATICS; 1 PPM THIOPHENE

EXPOSURE LIMITS:
BENZENE:

1 PPM OSHA TWA; 5 PPM OSHA 15 MINUTE STEL; 0.5 PPM OSHA ACTION LEVEL
10 PPM (30 MG/M3) ACGIH TWA;
ACGIH A2-SUSPECTED HUMAN CARCINOGEN
(NOTICE OF INTENDED CHANGES 1990-91)
0.1 PPM (0.32 MG/M3) NIOSH RECOMMENDED 8 HOUR TWA;
1 PPM (3.2 MG/M3) NIOSH RECOMMENDED 15 MINUTE CEILING

MEASUREMENT METHOD: CHARCOAL TUBE; CARBON DISULFIDE; GAS CHROMATOGRAPHY WITH
FLAME IONIZATION DETECTION; (NIOSH VOL. III # 1500, HYDROCARBONS).

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 TO LIGHT YELLOW LIQUID WITH AN AROMATIC ODOR

BOILING POINT: 176 F (80 C) MELTING POINT: 42 F (6 C)

SPECIFIC GRAVITY: 0.8765 @ 20 C VISCOSITY: 0.6468 CP @ 20 C

VOLATILITY: 100% VAPOR PRESSURE: 75 MMHG @ 20 C

EVAPORATION RATE: (BUTYL ACETATE = 1) 5.1 SOLUBILITY IN WATER: 0.18% @ 25 C

ODOR THRESHOLD: 4.68 PPM VAPOR DENSITY: 2.8

SOLVENT SOLUBILITY: ACETONE, ALCOHOL, CARBON DISULFIDE, ACETIC ACID,
CARBON TETRACHLORIDE, CHLOROFORM, ETHER, OILS

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:

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DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

MODERATE EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPOR-AIR MIXTURES ARE EXPLOSIVE ABOVE FLASH POINT.

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

DUE TO LOW ELECTROCONDUCTIVITY OF THE SUBSTANCE, FLOW OR AGITATION MAY GENERATE ELECTROSTATIC CHARGES RESULTING IN SPARKS WITH POSSIBLE IGNITION.

FLASH POINT: 12 F (-11 C) (CC) UPPER EXPLOSIVE LIMIT: 7.8%

LOWER EXPLOSIVE LIMIT: 1.2% AUTOIGNITION TEMP.: 928 F (498 C)

FLAMMABILITY CLASS(OSHA): IB

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).

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 27).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE WATER IN FLOODING QUANTITIES AS A FOG. SOLID STREAMS MAY SPREAD FIRE. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER; APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING HAZARDOUS MATERIALS; KEEP UPWIND. EVACUATE TO A RADIUS OF 1500 FEET FOR UNCONTROLABLE FIRES. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

WATER MAY BE INEFFECTIVE (NFPA 325M, FIRE HAZARD PROPERTIES OF FLAMMABLE LIQUIDS, GASES, AND VOLATILE SOLIDS, 1991)

FIRE FIGHTING PHASES: DRY CHEMICAL, ALCOHOL FOAM OR CARBON DIOXIDE. WATER MAY BE INEFFECTIVE. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROVIDE PROTECTION FOR THE MEN ATTEMPTING TO STOP THE LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

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 173.119
EXCEPTIONS: 49-CFR 173.118

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:
BENZENE-UN 1114U.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 IIU.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101
AND SUBPART E:
FLAMMABLE LIQUID

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242

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

TOXICITY

BENZENE:

IRRITATION DATA: 20 MG/24 HOURS SKIN-RABBIT MODERATE; 15 MG/24 HOURS OPEN SKIN-RABBIT MILD; 88 MG EYE-RABBIT MODERATE; 2 MG/24 HOURS EYE-RABBIT SEVERE

TOXICITY DATA: 2000 PPM/5 MINUTES INHALATION-HUMAN LCL0; 2 PPH/5 MINUTES INHALATION-HUMAN LCL0; 65 MG/M3/5 YEARS INHALATION-HUMAN LCL0; 100 PPM INHALATION-HUMAN TCL0; 150 PPM/1 YEAR INTERMITTENT INHALATION-HUMAN TCL0; 20,000 PPM/5 MINUTES INHALATION-MAMMAL LCL0; 10,000 PPM/7 HOURS INHALATION-RAT LC50; 300 PPM/6 HOURS/13 WEEKS INTERMITTENT INHALATION-RAT TCL0; 9980 PPM INHALATION-MOUSE LC50; 300 PPM/6 HOURS/13 WEEKS INTERMITTENT INHALATION-MOUSE TCL0; 103 PPM/6 HOURS/5 DAYS INTERMITTENT INHALATION-MOUSE TCL0; 10 PPM/6 HOURS/10 WEEKS INTERMITTENT INHALATION-MOUSE TCL0; 302 PPM/6 HOURS/26 WEEKS INTERMITTENT INHALATION-MOUSE TCL0; 4680 PPM/8 HOURS/4 DAYS INTERMITTENT INHALATION-MOUSE TCL0; 146,000 MG/M3 INHALATION-DOG LCL0; 170,000 MG/M3 INHALATION-CAT LCL0; 45,000 PPM/30 MINUTES INHALATION-RABBIT LCL0; 8263 MG/KG SKIN-RABBIT LD50; 8263 MG/KG SKIN-GUINEA PIG LD50; 50 MG/KG ORAL-MAN LDLO; 930 MG/KG ORAL-RAT LD50; 8600 MG/KG/27 WEEKS INTERMITTENT ORAL-RAT TDLO; 4700 MG/KG ORAL-MOUSE LD50; 2000 MG/KG ORAL-DOG LDLO; 88 MG/KG INTRAPERITONEAL-MOUSE LD50; 2890 UG/KG INTRAPERITONEAL-RAT LD50; 340 MG/KG INTRAPERITONEAL-MAMMAL LDLO; 527 MG/KG INTRAPERITONEAL-GUINEA PIG LDLO; 1500 MG/KG INTRAPERITONEAL-MAMMAL LDLO; 1400 MG/KG SUBCUTANEOUS-FROG LDLO; 194 MG/KG UNREPORTED-MAN LDLO. MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS); TUMORIGENIC DATA (RTECS).

CARCINOGEN STATUS: OSHA CARCINOGEN; KNOWN HUMAN CARCINOGEN (NTP); HUMAN SUFFICIENT EVIDENCE, ANIMAL SUFFICIENT EVIDENCE (IARC GROUP-1). NUMEROUS CASE REPORTS AND SERIES HAVE SUGGESTED A RELATIONSHIP BETWEEN EXPOSURE TO BENZENE AND THE OCCURRENCE OF VARIOUS TYPES OF LEUKEMIA. SEVERAL CASE-CONTROL STUDIES HAVE ALSO SHOWN INCREASED ODDS RATIOS FOR EXPOSURE TO BENZENE, BUT MIXED EXPOSURE PATTERNS AND POORLY DEFINED EXPOSURES RENDER THEIR INTERPRETATION DIFFICULT. THREE INDEPENDENT COHORT STUDIES HAVE DEMONSTRATED AN INCREASED INCIDENCE OF ACUTE NONLYMPHOCTIC LEUKEMIA IN WORKERS EXPOSED TO BENZENE (29-3).

LOCAL EFFECTS: IRRITANT- INHALATION, SKIN AND EYE.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INHALATION AND INGESTION; SLIGHTLY TOXIC BY DERMAL ABSORPTION.

TARGET EFFECTS: CENTRAL NERVOUS SYSTEM DEPRESSANT; BONE MARROW DEPRESSANT. POISONING MAY ALSO AFFECT THE IMMUNE SYSTEM AND THE HEART.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH CERTAIN IMMUNOLOGICAL TENDENCIES, POOR NUTRITION, ANEMIA AND DRUG OR CHEMICALLY INDUCED AGRANULOCYTOSIS.

ADDITIONAL DATA: USE OF ALCOHOLIC BEVERAGES MAY ENHANCE THE TOXIC EFFECTS. USE OF STIMULANTS SUCH AS EPINEPHRINE MAY CAUSE CARDIAC ARRHYTHMIAS. MAY CROSS THE PLACENTA. INTERACTIONS WITH MEDICATIONS HAVE BEEN REPORTED.

HEALTH EFFECTS AND FIRST AID

INHALATION:

BENZENE:

IRRITANT/NARCOTIC/BONE MARROW DEPRESSANT/CARCINOGEN.

ACUTE EXPOSURE- CONCENTRATIONS OF 3000 PPM MAY CAUSE RESPIRATORY TRACT IRRITATION; MORE SEVERE EXPOSURES MAY RESULT IN PULMONARY EDEMA. SYSTEMIC EFFECTS ARE MAINLY ON THE CENTRAL NERVOUS SYSTEM AND DEPEND ON EXPOSURE TIME AND CONCENTRATION. NO EFFECTS WERE NOTED AT 25 PPM FOR 8 HOURS; SIGNS OF INTOXICATION BEGAN AT 50-150 PPM WITHIN 5 HOURS; AT 500-1500 PPM, WITHIN 1 HOUR; WERE SEVERE AT 7500 PPM, WITHIN 30-60 MINUTES; AND 20,000 PPM WAS FATAL WITHIN 5-10 MINUTES. EFFECTS MAY INCLUDE NAUSEA, VOMITING, HEADACHE, DIZZINESS, DROWSINESS, WEAKNESS, SOMETIMES PRECEDED BY A BRIEF PERIOD OF EXHILARATION OR EUPHORIA, IRRITABILITY, MALAISE, CONFUSION, ATAXIA, STAGGERING, WEAK, RAPID PULSE, CHEST PAIN AND TIGHTNESS WITH BREATHLESSNESS, PALLOR, CYANOSIS OF THE LIPS AND FINGERTIPS, AND TINNITUS. IN SEVERE EXPOSURES THERE MAY BE BLURRED VISION, SHALLOW, RAPID BREATHING, DELIRIUM, CARDIAC ARRHYTHMIAS, UNCONSCIOUSNESS, DEEP ANESTHESIA, PARALYSIS, AND COMA CHARACTERIZED BY MOTOR RESTLESSNESS, TREMORS AND HYPERREFLEXIA, SOMETIMES PRECEDED BY CONVULSIONS. RECOVERY DEPENDS ON THE SEVERITY OF EXPOSURE. POLYNEURITIS MAY OCCUR AND THERE MAY BE PERSISTENT NAUSEA, ANOREXIA, MUSCULAR WEAKNESS, HEADACHE, DROWSINESS, INSOMNIA, AND AGITATION. NERVOUS IRRITABILITY, BREATHLESSNESS, AND UNSTEADY GAIT MAY PERSIST FOR 2-3 WEEKS. A PECULIAR SKIN COLOR AND CARDIAC DISTRESS MAY PERSIST FOR 4 WEEKS. LIVER AND KIDNEY EFFECTS MAY OCCUR, BUT ARE USUALLY MILD. TEMPORARY IMPAIRMENTS, CHROMOSOMAL DAMAGE HAS BEEN FOUND AFTER EXPOSURE TO TOXIC LEVELS, ALTHOUGH GENERALLY HEMATOTOXICITY IS NOT A SIGNIFICANT CONCERN IN ACUTE EXPOSURE. DELAYED HEMATOLOGICAL EFFECTS, INCLUDING ANEMIA AND THROMBOCYTOPENIA, HAVE BEEN REPORTED, AS HAVE PETECHIAL HEMORRHAGES, SPONTANEOUS INTERNAL BLEEDING AND SECONDARY INFECTIONS. IN FATAL EXPOSURES, DEATH MAY BE DUE TO ASPHYXIA, CENTRAL NERVOUS SYSTEM DEPRESSION, CARDIAC OR RESPIRATORY FAILURE AND CIRCULATORY COLLAPSE, OR OCCASIONALLY, SUDDEN VENTRICULAR FIBRILLATION. IT MAY OCCUR WITHIN A FEW MINUTES TO SEVERAL HOURS, OR CARDIAC ARRHYTHMIA MAY OCCUR AT ANYTIME WITHIN 24 HOURS. ALSO, DEATH FROM CENTRAL NERVOUS SYSTEM, RESPIRATORY OR HEMORRHAGIC COMPLICATIONS MAY OCCUR

UP TO 5 DAYS AFTER EXPOSURE. PATHOLOGIC FINDINGS HAVE INCLUDED RESPIRATORY INFLAMMATION WITH EDEMA AND HEMORRHAGE OF THE LUNGS, RENAL CONGESTION, CEREBRAL EDEMA, AND EXTENSIVE PETECHIAL HEMORRHAGES IN THE BRAIN, PLEURAE, PERICARDIUM, URINARY TRACT, MUCOUS MEMBRANES, AND SKIN. CHRONIC EXPOSURE- LONGTERM IMMUNE SYSTEMS, EARLY EFFECTS ARE VAGUE AND VARIED AND MAY INCLUDE HEADACHE, LIGHT-HEADEDNESS, DIZZINESS, NAUSEA, ANOREXIA, ABDOMINAL DISCOMFORT, AND FATIGUE. SORE DRY THROAT, WEAKNESS, LETHARGY, MALAISE, DROWSINESS, NERVOUSNESS, AND IRRITABILITY HAVE ALSO BEEN REPORTED. LATER THERE MAY BE DYSPNEA, PALLOR, SLIGHTLY INCREASED TEMPERATURE, DECREASED BLOOD PRESSURE, RAPID PULSE, PALPITATIONS, AND VISUAL DISTURBANCES. DIZZINESS WHEN COLD WATER IS PLACED IN THE EAR AND HEARING IMPAIRMENT HAVE BEEN REPORTED, AS HAVE DIFFUSE CEREBRAL ATROPHY ASSOCIATED WITH ATAXIA, TREMORS AND EMOTIONAL LABILITY. WORKERS EXPOSED TO BENZENE IN COMBINATION WITH OTHER SOLVENTS HAVE EXHIBITED POLYNEURITIS. SEVERAL CASE REPORTS, ONE OF THEM AN ACUTE EXPOSURE, SUGGEST THE POSSIBILITY THAT SYSTEMIC EXPOSURE MAY BE ASSOCIATED WITH RETROBULAR OR OPTIC NEURITIS, OCCASIONALLY HEMORRHAGES IN RETINA AND CONJUNCTIVA OCCUR AND RARELY NEURORETINAL EDEMA AND PAPILLEDEMA HAVE ACCOMPANIED THE RETINAL HEMORRHAGES. HEMATOLOGICAL EFFECTS VARY WIDELY AND MAY APPEAR AFTER A FEW WEEKS OR MANY YEARS OF EXPOSURE OR EVEN MANY YEARS AFTER EXPOSURE HAS CEASED. THE DEGREE OF EXPOSURE BELOW WHICH NO BLOOD EFFECTS WILL OCCUR CANNOT BE ESTABLISHED WITH CERTAINTY. IN THE EARLY STAGES, THERE MAY BE BLOOD CLOTTING DEFECTS DUE TO MORPHOLOGICAL, FUNCTIONAL AND QUANTITATIVE PLATELET ALTERATION WITH RESULTANT BLEEDING FROM THE NOSE AND GUMS, EASY BRUISING AND PETECHIAE, LEUKOPENIA WITH PREDOMINANT LYMPHOCYTOPENIA OR NEUTROPENIA, AND ANEMIA WHICH MAY BE NORMOCHROMIC OR MACROCYTTIC AND HYPOCHROMIC. EXTRAMEDULLARY HEMATOPOIESIS, SPLENOMEGALY, CIRCULATING IMMATURE MARROW CELLS, AND AN INITIAL INCREASE IN LEUKOCYTES, ERYTHROCYTES AND PLATELETS HAVE ALSO BEEN REPORTED. THE BONE MARROW MAY BE HYPER- OR NORMOPLASTIC AND DOES NOT ALWAYS CORRELATE WITH THE PERIPHERAL BLOOD PICTURE. ALSO, THE SYMPTOMS DO NOT ALWAYS PARALLEL THE LABORATORY FINDINGS. IF TREATED AT THIS STAGE, THE EFFECTS APPEAR REVERSIBLE, ALTHOUGH RECOVERY MAY BE PROTRACTED AND THERE MAY BE RELAPSES. DECREASED ERYTHROCYTE SURVIVAL, HEMOLYSIS, CAPILLARY FRAGILITY, INTERNAL HEMORRHAGES, IRON METABOLISM DISTURBANCES, AND HYPERBILIRUBINEMIA HAVE ALSO BEEN REPORTED. EXPOSURE TO HIGH LEVELS FOR LONGER PERIODS MAY RESULT IN APLASIA AND FATTY DEGENERATION OF THE BONE MARROW WITH PANCYTOPENIA. THE MOST SERIOUS CASES OF APLASTIC ANEMIA MAY BE FATAL DUE TO HEMORRHAGE AND INFECTION; DEATH MAY OCCUR WITHIN 3 MONTHS OF DIAGNOSIS. ENORMOUS VARIABILITY IN INDIVIDUAL RESPONSE, INCLUDING NON-DOSE DEPENDENT APLASIA, AND THE FINDING OF EOSINOPHILIA SUGGESTS THAT, IN SOME CASES, THE BLOOD DYSCRASIA MAY PARTIALLY BE AN ALLERGIC REACTION. NUMEROUS CASE REPORTS AND SERIES HAVE SUGGESTED A RELATIONSHIP BETWEEN EXPOSURE TO BENZENE AND THE OCCURRENCE OF VARIOUS TYPES OF LEUKEMIA. SEVERAL CASE-CONTROL STUDIES HAVE ALSO SHOWN INCREASED ODDS RATIOS FOR EXPOSURE TO BENZENE, BUT MIXED EXPOSURE PATTERNS AND POORLY DEFINED EXPOSURES RENDER THEIR INTERPRETATION DIFFICULT. THREE INDEPENDENT COHORT STUDIES HAVE DEMONSTRATED AN INCREASED INCIDENCE OF ACUTE NONLYMPHOCTIC LEUKEMIA IN WORKERS EXPOSED TO BENZENE. SEVERAL STUDIES HAVE ALSO SUGGESTED A LINK BETWEEN OCCUPATIONAL EXPOSURE AND MULTIPLE MYELOMA AND LYMPHOMA, BOTH HODGKIN'S AND NONHODGKIN'S. ALTHOUGH APLASTIC ANEMIA IS PROBABLY THE MORE LIKELY CONSEQUENCE OF LONGTERM EXPOSURE, IT IS NOT UNCOMMON FOR AN INDIVIDUAL SURVIVING THIS, TO GO THROUGH A PRELEUKEMIC PHASE INTO FRANK LEUKEMIA. CONVERSELY, LEUKEMIA WITHOUT PRECEDENT APLASTIC ANEMIA CAN OCCUR. IN ONE STUDY THE RANGE OF TIME FROM THE START OF THE EXPOSURE TO THE DIAGNOSIS OF LEUKEMIA WAS 3-24 YEARS. IT HAS BEEN SUGGESTED THAT THE CHROMOSOMAL ABERRATIONS WHICH CAN ARISE IN PERIPHERAL BLOOD AND BONE MARROW CELLS AND PERSIST FOR A LONG TIME AFTER EXPOSURE CEASES, MAY BE ASSOCIATED WITH THE INCREASED INCIDENCE OF LEUKEMIA. THE IMMUNOSUPPRESSIVE EFFECT HAS ALSO BEEN SUGGESTED AS BEING ASSOCIATED WITH THE LEUKEMIOGENESIS. ADVERSE EFFECTS ON THE IMMUNOLOGICAL SYSTEM HAVE BEEN SHOWN TO MAKE RABBITS MORE SUSCEPTIBLE TO TUBERCULOSIS AND PNEUMONIA AND MAY EXPLAIN WHY THE TERMINAL EVENT IN SOME CASES OF BENZENE INTOXICATION MAY BE OVERWHELMING INFECTION. EXPOSED MICE EXHIBITED A TENDENCY TOWARD INDUCTION OF LYMPHOID NEOPLASMS. RATS EXHIBITED AN INCREASED INCIDENCE OF NEOPLASMS, MAINLY CARCINOMAS, AT VARIOUS SITES. MENSTRUAL DISTURBANCES HAVE BEEN REPORTED MORE FREQUENTLY IN EXPOSED WOMEN. TESTICULAR DAMAGE HAS BEEN REPORTED IN RATS, RABBITS AND GUINEA PIGS. SOME ANIMAL STUDIES HAVE DEMONSTRATED EMBRYO/FETOTOXICITY, SOMETIMES AT LEVELS AS LOW AS 10 PPM AND THE POTENTIAL FOR TERATOGENIC EFFECTS SUCH AS DECREASED BODY WEIGHT AND SKELETAL VARIANTS, HAVE ALSO BEEN SHOWN. OTHER STUDIES HAVE NOT PRODUCED ANY ABNORMALITIES OR EMBRYOLETHALITY.

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:

BENZENE:

IRRITANT.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE IRRITATION. EFFECTS MAY INCLUDE ERYTHEMA, A BURNING SENSATION, AND WITH PROLONGED CONTACT, BLISTERING AND EDEMA. UNDER NORMAL CONDITIONS, SIGNIFICANT SIGNS OF SYSTEMIC TOXICITY ARE UNLIKELY FROM SKIN CONTACT ALONE DUE TO THE SLOW RATE OF ABSORPTION; IT MAY HOWEVER, CONTRIBUTE TO THE TOXICITY FROM INHALATION. APPLICATION

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TO GUINEA PIGS RESULTED IN INCREASED DERMAL PERMEABILITY. CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT DEFATS THE SKIN AND MAY RESULT IN DERMATITIS WITH ERYTHEMA, SCALING, DRYNESS, VESICULATION, AND FISSURING, POSSIBLY ACCOMPANIED BY PARESTHESIAS OF THE FINGERS WHICH MAY PERSIST SEVERAL WEEKS AFTER THE DERMATITIS SUBSIDES. PERIPHERAL NEURITIS HAS ALSO BEEN REPORTED. SECONDARY INFECTIONS MAY OCCUR. TESTS ON GUINEA PIGS INDICATE SENSITIZATION IS POSSIBLE. ALTHOUGH ANIMAL STUDIES HAVE FAILED TO ESTABLISH A RELATIONSHIP BETWEEN SKIN CONTACT AND A CARCINOGENIC EFFECT, MOST OF THE STUDIES WERE INADEQUATE; SOME PAPILOMAS AND HEMATOPHOETIC EFFECTS HAVE BEEN REPORTED.

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:
BENZENE:
IRRITANT.

ACUTE EXPOSURE- MAY CAUSE IRRITATION. VAPOR CONCENTRATIONS OF 3000 PPM ARE VERY IRRITATING, EVEN ON BRIEF EXPOSURE. DROPLETS CAUSE A MODERATE BURNING SENSATION, BUT ONLY A SLIGHT, TRANSIENT CORNEAL EPITHELIAL INJURY WITH RAPID RECOVERY.
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS. 50% OF RATS EXPOSED TO 50 PPM FOR MORE THAN 600 HOURS DEVELOPED CATARACTS.

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:

BENZENE:
NARCOTIC/CARCINOGEN.

ACUTE EXPOSURE- MAY CAUSE LOCAL IRRITATION AND BURNING SENSATION IN THE MOUTH, THROAT AND STOMACH, AND HEMORRHAGIC INFLAMMATORY LESIONS OF THE MUCOUS MEMBRANES IN CONTACT WITH THE LIQUID. SIGNS AND SYMPTOMS OF SYSTEMIC INTOXICATION MAY INCLUDE NAUSEA, VOMITING, HEADACHE, DIZZINESS, WEAKNESS, STAGGERING, CHEST PAIN AND TIGHTNESS, SHALLOW, RAPID PULSE AND RESPIRATION, BREATHLESSNESS, PALLOR FOLLOWED BY FLUSHING, AND A FEAR OF IMPENDING DEATH. THERE MAY BE VISUAL DISTURBANCES, TREMORS, CONVULSIONS, VENTRICULAR IRREGULARITIES, AND PARALYSIS. EXCITEMENT, EUPHORIA OR DELIRIUM MAY PRECEDE WEARINESS, FATIGUE, SLEEPINESS AND FOLLOWED BY STUPOR AND UNCONSCIOUSNESS, COMA AND DEATH FROM RESPIRATORY FAILURE. THOSE WHO SURVIVE THE CENTRAL NERVOUS SYSTEM EFFECTS MAY DEVELOP BRONCHITIS, PNEUMONIA, PULMONARY EDEMA, AND INTRAPULMONARY HEMORRHAGE. ASPIRATION MAY CAUSE IMMEDIATE PULMONARY EDEMA AND HEMORRHAGE. THE USUAL LETHAL DOSE IN HUMANS IS 10-15 MILLILITERS, BUT SMALLER AMOUNTS HAVE BEEN REPORTED TO CAUSE DEATH. A SINGLE EXPOSURE MAY PRODUCE LONGTERM EFFECTS WITH PANCYTOPENIA PERSISTING UP TO A YEAR.
CHRONIC EXPOSURE- DAILY ADMINISTRATION TO HUMANS OF 2-5 GRAMS IN OLIVE OIL CAUSED HEADACHE, VERTIGO, BLADDER IRRITABILITY, IMPOTENCE, GASTRIC DISTURBANCES, AND EVIDENCE OF RENAL CONGESTION. IN FEMALE RATS TREATED WITH 132 SINGLE DAILY DOSES OVER 187 DAYS, NO EFFECTS WERE OBSERVED AT 1 MG/KG; SLIGHT LEUKOPENIA AT 10 MG/KG; AND BOTH LEUKOPENIA AND ANEMIA AT 50 AND 100 MG/KG. ORAL ADMINISTRATION TO RATS AND MICE AT VARIOUS DOSE LEVELS INDUCED NEOPLASMS AT MULTIPLE SITES IN MALES AND FEMALES. IN A ONE YEAR GAVAGE STUDY, RATS GIVEN 50 OR 250 MG/KG, 4-5 DAYS/WEEK FOR 52 WEEKS DID NOT EXHIBIT ACUTE OR SUBACUTE TOXIC EFFECTS, BUT A DOSE CORRELATED INCREASE OF LEUKEMIAS AND MAMMARY CARCINOMAS WAS OBSERVED. SOME OTHER TUMOR TYPES WERE ALSO REPORTED. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- EXTREME CARE MUST BE USED TO PREVENT ASPIRATION. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IN PLACE TO PREVENT FURTHER ASPIRATION SHOULD BE DONE WITHIN 15 MINUTES. IN THE ABSENCE OF DEPRESSION OR CONVULSIONS OR IMPAIRED GAG REFLEX, EMESIS CAN ALSO BE INDUCED USING SYRUP OF IPECAC WITHOUT INCREASING THE HAZARD OF ASPIRATION (DREIBSACH, 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

REACTIVITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
BENZENE:

ACIDS (STRONG): INCOMPATIBLE.
ALLYL CHLORIDE WITH DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE: POSSIBLE EXPLOSION.
ARSENIC PENTAFLUORIDE + POTASSIUM METHOXIDE: EXPLOSIVE INTERACTION.
BASES (STRONG): INCOMPATIBLE.
BROMINE + IRON: INCOMPATIBLE.
BROMINE PENTAFLUORIDE: FIRE AND EXPLOSION HAZARD.
BROMINE TRIFLUORIDE: POSSIBLE EXPLOSION OR IGNITION.

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CHLORINE: EXPLOSION IN THE PRESENCE OF LIGHT.
CHLORINE TRIFLUORIDE: VIOLENT REACTION WITH POSSIBLE EXPLOSION.
CHROMIC ANHYDRIDE (POWDERED): IGNITION.
DIBORANE: SPONTANEOUSLY EXPLOSIVE REACTION IN AIR.
DIOXYGEN DIFLUORIDE: IGNITION, EVEN AT REDUCED TEMPERATURES.
DIOXYGENYL TETRAFLUOROBORATE: IGNITION REACTION.
INTERHALOGEN COMPOUNDS: IGNITION OR EXPLOSION.
IODINE HEPTAFLUORIDE: IGNITION ON CONTACT.
IODINE PENTAFLUORIDE: VIOLENT INTERACTION ABOVE 50 C.
NITRIC ACID: VIOLENT OR EXPLOSIVE UNLESS PROPERLY AGITATED AND COOLED.
NITRIL PERCHLORATE: EXPLOSIVE INTERACTION.
OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.
OXYGEN (LIQUID): EXPLOSIVE MIXTURE.
OZONE: FORMATION OF EXPLOSIVE GELATINOUS OZONIDE.
PERCHLORATES (METAL): FORMATION OF EXPLOSIVE COMPLEX.
PERCHLORYL FLUORIDE + ALUMINUM CHLORIDE: FORMATION OF SHOCK SENSITIVE COMPOUND.
PERMANGANATES + SULFURIC ACID: POSSIBLE EXPLOSION.
PERMANGANIC ACID: EXPLOSION HAZARD.
PEROXODISULFURIC ACID: EXPLOSION HAZARD.
PEROXOMONOSULFURIC ACID: EXPLOSIVE INTERACTION.
POTASSIUM PEROXIDE: IGNITION.
SILVER PERCHLORATE: FORMATION OF EXPLOSIVE COMPLEX.
SODIUM PEROXIDE + WATER: IGNITION.
URANIUM HEXAFLUORIDE: 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.

PROTECT AGAINST PHYSICAL DAMAGE. OUTSIDE OR DETACHED STORAGE IS PREFERABLE. INSIDE STORAGE SHOULD BE IN A STANDARD FLAMMABLE LIQUIDS STORAGE ROOM OR CABINET. SEPARATE FROM OXIDIZING MATERIALS (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U019.

BENZENE - REGULATORY LEVEL: 0.5 MG/L (TCLP-40 CFR 261 APPENDIX II)
MATERIALS WHICH CONTAIN THE ABOVE SUBSTANCE AT OR ABOVE THE TCLP REGULATORY LEVEL MEET THE EPA TOXICITY CHARACTERISTIC, AND MUST BE DISPOSED OF IN ACCORDANCE WITH 40 CFR PART 262. EPA HAZARDOUS WASTE NUMBER D018.

CONDITIONS TO AVOID

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE. AVOID OVERHEATING OF CONTAINERS; CONTAINERS MAY VIOLENTLY RUPTURE IN HEAT OF FIRE. AVOID CONTAMINATION OF WATER SOURCES.

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.
DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FOAMED BARRIERS SUCH AS POLYURETHANE OR CONCRETE.
USE CEMENT POWDER, FLY ASH, SAWDUST OR COMMERCIAL SORBENT TO ABSORB BULK LIQUID.
REDUCE VAPOR AND FIRE HAZARD WITH FLUOROCARBON WATER FOAM.

AIR SPILL:
KNOCK DOWN VAPORS WITH WATER SPRAY. KEEP UPWIND.

WATER SPILL:
LIMIT SPILL MOTION AND DISPERSION WITH NATURAL BARRIERS OR OIL SPILL CONTROL

BOOMS.
 APPLY DETERGENTS, SOAPS, ALCOHOLS OR ANOTHER SURFACE ACTIVE AGENT TO THICKEN SPILLED MATERIAL.
 APPLY UNIVERSAL GELLING AGENT TO IMMOBILIZE TRAPPED SPILL AND INCREASE EFFICIENCY OF REMOVAL.
 IF DISSOLVED, APPLY ACTIVATED CARBON AT TEN TIMES THE SPILLED AMOUNT IN THE REGION OF 10 PPM OR GREATER CONCENTRATION.
 USE SUCTION HOSES TO REMOVE TRAPPED SPILL MATERIAL.
 USE DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

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 RESTRICT ENTRY.

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 OR PROCESS ENCLOSURE VENTILATION TO MEET THE PUBLISHED EXPOSURE LIMITS. VENTILATION EQUIPMENT MUST BE EXPLOSION-PROOF.

BENZENE:
 VENTILATION SHOULD MEET THE REQUIREMENTS IN 29 CFR 1910.1028(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.

BENZENE:

CONCENTRATION: REQUIRED RESPIRATOR:

LESS THAN OR
 EQUAL TO 10 PPM- HALF-MASK AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE.

LESS THAN OR
 EQUAL TO 50 PPM- FULL FACEPIECE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES.
 FULL FACEPIECE GAS MASK WITH CHIN STYLE CANISTER.

LESS THAN OR
 EQUAL TO 100 PPM- FULL FACEPIECE POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CANISTER.

LESS THAN OR
 EQUAL TO 1000 PPM- SUPPLIED AIR RESPIRATOR WITH FULL FACEPIECE IN POSITIVE-PRESSURE MODE.

GREATER THAN
 1000 PPM OR
 UNKNOWN
 CONCENTRATION- SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE IN POSITIVE-PRESSURE MODE.
 FULL FACEPIECE POSITIVE-PRESSURE SUPPLIED-AIR RESPIRATOR WITH AUXILIARY SELF-CONTAINED AIR SUPPLY.

ESCAPE- ANY ORGANIC VAPOR GAS MASK.
 ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE.

FIREFIGHTING- FULL FACEPIECE SELF-CONTAINED BREATHING APPARATUS IN POSITIVE-PRESSURE MODE.

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.

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 ORGANIC VAPOR CANISTER.
 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.

BENZENE:
 PROTECTIVE CLOTHING SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29 CFR 1910.1028(H).

GLOVES:
 EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

BENZENE:
 PROTECTIVE GLOVES SHOULD MEET THE REQUIREMENTS FOR PERSONAL PROTECTIVE EQUIPMENT IN 29 CFR 1910.1028(H).

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.

BENZENE:
 PROTECTIVE EYE EQUIPMENT SHOULD MEET THE REQUIREMENTS FOR PROTECTIVE CLOTHING AND EQUIPMENT IN 29 CFR 1910.1028(H).

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