



Material Safety Data Sheet*

Chemical Division

TITANIUM TETRACHLORIDE POISON

Shea 22,936
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This Material Safety Data Sheet (MSDS) meets the requirements of the federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the Canadian Controlled Product Regulation, WHMIS classified as: D-1A, D-2A, D-2B, E, F.

New Issue 10/88
Supersedes Issue Dated 5/86
MSDS No. 985111/TIT514
PIN: UN1838

EMERGENCY TELEPHONE NUMBERS

Transportation Emergencies:

USA-CHEMTREC: 1-800-424-9300
CANADA-CANUTEC: 613-996-6666

All Other Emergencies Call:

312-906-7054

I. PRODUCT IDENTIFICATION/COMPOSITION

Titanium Tetrachloride (approx. 100%),
CAS Registry Number: 7550-45-0

SYNONYM: Titanic Chloride

FORMULA: $TiCl_4$

FORMULA WEIGHT: 189.7

II. PHYSICAL/CHEMICAL PROPERTIES

The following represent all available, applicable physical hazard data on this product.

PHYSICAL STATE/DESCRIPTION:

Colorless liquid, irritating odor

SPECIFIC GRAVITY:

1.726 at 68°F/68°F (20°C/20°C)

FREEZING POINT:

-22°F (-30°C)

BOILING POINT:

277°F (136.4°C)

SOLUBILITY:

Hydrolyzes in water with evolution of heat.

VAPOR PRESSURE:

12.4 mm Hg at 77°F (25°C)
7.1 mm Hg at 60°F (15°C)

III. CHEMICAL REACTIVITY

Reacts violently with water producing hydrogen chloride, titanium oxychloride and titanium oxides. This reaction will generate a considerable amount of heat. Fumes strongly when exposed to moist air forming a dense white cloud. It is not sensitive to physical impact.

In Canada: Akzo Chemicals Ltd., 100 University Avenue, Ste. 908,
Toronto, Ontario M5J 1V6

SAL 000009934

*Also referred to as a Product Safety Information Sheet

All information concerning this product and/or all suggestions for handling and use contained herein are offered in good faith and are believed to be reliable. Akzo Chemicals Inc., however, makes no warranty as to the accuracy and/or sufficiency of such information and/or suggestions, as to the product's merchantability or fitness for any particular purpose, or that any suggested use will not infringe any patent. Nothing contained herein shall be construed as granting or extending any license under any patent. Buyer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes. The information contained herein supersedes all previously issued bulletins on the subject matter covered.

Akzo Chemicals Inc.
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Chicago, Illinois 60606
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TITANIUM TETRACHLORIDE

IV. STABILITY

Stable when stored in an inert atmosphere. Use nitrogen containing less than 10 ppm oxygen.

V. FIRE HAZARD

Not defined as flammable or combustible. However, the product may support combustion and decompose under fire conditions to give off toxic materials such as hydrogen chloride and chlorine gases. It is not sensitive to static discharge.

VI. FIREFIGHTING TECHNIQUE

Products of combustion are irritating to the respiratory tract and may cause breathing difficulty and pulmonary edema. Symptoms may be delayed several hours or longer depending upon the extent of exposure.

As in any fire, prevent human exposure to fire, smoke, fumes or products of combustion. Evacuate nonessential personnel from the fire area. Firefighters should wear full-face, self-contained breathing apparatus and impervious protective clothing.

If not leaking, keep fire-exposed containers cool with a water spray to prevent rupture due to excessive heat. Do not use high pressure water hose as it may spread product from broken containers increasing contamination or fire hazard. Do not get water inside containers as a vigorous reaction may result, generating high temperatures and pressures.

Small Fires: Use dry chemical or carbon dioxide.

Large Fires: Flood with water. Copious quantities are required to scrub out the liberated hydrogen chloride and wash away the $TiCl_4$ residues.

Contaminated buildings, areas and equipment must not be used until they are properly decontaminated.

VII. TOXICOLOGY

INGESTION:

The acute oral LD50 is less than 464 mg/kg in male rats. A single oral dose of 464 mg/kg produced a severe decrease in physical activity and 100 percent mortality.

SKIN CONTACT:

The acute dermal LD50 is 3160 mg/kg in rabbits. A single dermal application of 1000 mg/kg did not produce symptoms of toxicity in rabbits. Local effects included moderate to severe necrosis and edema.

INHALATION:

The acute inhalation LC50 is 0.4 mg/l in rats for a four-hour inhalation exposure. The cause of death appeared to be pulmonary edema. Repeated inhalation exposures in rats to 0.04 mg/l for 6 hours per day/five days per week for four weeks produced decreased weight gain, inflammation of the respiratory tract, pulmonary fibrosis and 8 percent mortality. Similar treatment to 0.005 mg/l showed no treatment related effects (Kelly et al., 1981).

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VIII. HUMAN HEALTH

The principal routes of exposure are skin contact and inhalation. Contact with the skin or eyes may produce severe irritation or burns.

Inhalation of titanium tetrachloride or fumes may produce severe irritation to the upper respiratory tract with coughing, burning of the throat, headache, dizziness and weakness. Lung damage, pulmonary edema and even death may occur after severe exposures. Bronchial irritation with a chronic cough and bronchial pneumonia may result from prolonged or repeated exposures to low concentrations.

Titanium tetrachloride is not classified as a carcinogen by IARC, NTP or OSHA. However, in a lifetime inhalation test conducted by DuPont, microscopic lung cancers were found in 5 of 150 rats exposed at 10 mg/m³ TiCl₄. This is suggestive evidence for a slight increase in cancer risk with long-term continuous inhalation of vapors from titanium tetrachloride (Lee et al., 1986).

IX. FIRST AID

CALL A POISON CENTER OR A PHYSICIAN IMMEDIATELY

If a known exposure occurs or if poisoning is suspected, do not wait for symptoms to develop. Immediately start the recommended procedures below and simultaneously contact a Poison Center, a physician or the nearest hospital. Inform the person contacted of the type and extent of exposure, describe the victim's symptoms and follow the advice given.

INGESTION:

If swallowed, immediately give several glasses of water, but do not induce vomiting. This material is corrosive. If vomiting does occur, give fluids again. Have a physician determine if condition of patient will permit induction of vomiting or evacuation of stomach. Do not give anything by mouth to an unconscious or convulsing person.

SKIN CONTACT:

Using a dry cloth, immediately wipe away excess material from the skin and remove all contaminated clothing and shoes. Under a safety shower, flush all affected areas thoroughly with large amounts of running water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Get medical attention immediately. Discard contaminated clothing and shoes.

EYE CONTACT:

Immediately flush the eyes with large quantities of running water for a minimum of 15 minutes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids with water. Do not attempt to neutralize with chemical agents. Obtain medical attention as soon as possible. Oils or ointments should not be used at this time. Continue the flushing for an additional 15 minutes if a physician is not immediately available.

INHALATION:

If inhaled, remove to fresh air. If not breathing, clear victim's airway and start mouth-to-mouth artificial respiration, which may be supplemented by the use of a bag-mask respirator or manually triggered oxygen supply capable of delivering one liter per second or more. If victim is

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breathing, supplemental oxygen may be given from a demand-type or continuous-flow inhaler, preferably with a physician's advice. Get medical attention immediately.

X. INDUSTRIAL HYGIENE

The recommendations described in this section are provided as general guidance for minimizing exposure when handling this product. Because use conditions will vary depending upon customer applications, specific safe handling procedures should be developed by a person knowledgeable of the intended use conditions and equipment. During the development of safe handling procedures, consideration should be given to the need for cleaning of equipment and piping systems to render them nonhazardous before maintenance and repair activities are performed. Waste resulting from these procedures should be handled in accordance with SECTION XIV: DISPOSAL OF MATERIAL/CONTAINER.

ENGINEERING CONTROLS:

In those cases where engineering controls are indicated by the use conditions, the following traditional exposure control techniques may be used to effectively minimize employee exposure: local exhaust ventilation, enclosed system design or process isolation and remote control in combination with appropriate use of personal protective equipment.

INGESTION:

All food must be kept in a separate area away from the storage/use location. Eating, drinking, smoking and carrying of tobacco products must be prevented in areas where there is a potential for exposure to this material. Before eating, drinking or smoking, hands and face must be thoroughly washed.

SKIN CONTACT:

Skin contact with liquid or its aerosol must be prevented through the use of impervious clothing, gloves and footwear selected with regard for use condition exposure potential.

Safety showers, with quick opening valves which stay open, should be readily available in all areas where the material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze ups in cold weather.

EYE CONTACT:

Eye contact with liquid or aerosol must be prevented through the use of chemical safety glasses, goggles or a face shield selected with regard for use condition exposure potential.

Eye wash fountains, or other means of washing the eyes with a gentle flow of tap water, should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather.

INHALATION:

This material is normally handled under closed process conditions. In an emergency situation where adequate ventilation is not available and use conditions could generate vapor or hydrogen chloride fumes, inhalation must be prevented through the use of NIOSH-approved, acid-gas respirators with dust, mist and fume filters to reduce potential for exposure under the use conditions. Where exposure potential under the use conditions necessitates a higher level of protection, use a positive-pressure, air-supplied respirator.

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EXPOSURE LIMITS:

No exposure limits have been established for this material. However, contact with moisture liberates hydrogen chloride which is toxic and corrosive. The following exposure limits apply for hydrogen chloride.

The federal OSHA Permissible Exposure Limit (PEL) is a ceiling limit of 5 ppm (7 mg/m³) (20 CFR 1910.1000).

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended a Threshold Limit Value (TLV) which is the same as the PEL (ACGIH, 1988).

PELs and TLVs refer to airborne concentrations measured in the breathing zone by appropriate sampling techniques.

XI. SPILL HANDLING

Make sure all personnel involved in the spill cleanup follow good industrial hygiene practices (refer to SECTION X: INDUSTRIAL HYGIENE).

Any person entering either a significant spill area or an area of unknown concentration of a vapor or hydrogen chloride fumes should use a positive-pressure, self-contained breathing apparatus or a positive-pressure, air-supplied respirator with escape pack.

Small spills can be handled routinely. Use adequate ventilation and/or wear a NIOSH-approved, acid-gas respirator with dust, mist and fume filter to prevent inhalation exposure. Wear protective clothing to prevent skin and eye contact. Use the following procedures:

Soak up pooled liquid with a suitable absorbent such as clay, sawdust or kitty litter. Sweep up absorbed material and place in a chemical waste container for disposal (refer to SECTION XIV: DISPOSAL OF MATERIAL/CONTAINER). Generously cover contaminated area with a slurry of common household, powdered laundry detergent and water. Using a stiff brush, work the slurry into cracks and crevices. Allow to stand for 2-3 minutes then flush with water. Repeat if necessary.

Large spills should be handled according to a predetermined plan.

XII. CORROSIVITY TO MATERIALS OF CONSTRUCTION

Under totally anhydrous conditions, mild carbon steel may be used. Moisture will cause hydrolysis to titanium oxychloride and hydrogen chloride which will corrode most metals including carbon steel.

XIII. STORAGE REQUIREMENTS

Containers should be stored in a cool, dry, well ventilated area away from flammable materials and sources of heat or flame. Store away from foodstuffs or animal feed. Exercise due caution to prevent damage to or leakage from the container. Containers should only be opened in a dry, oxygen free inert atmosphere.

Carbon steel is the preferred material of construction for storage containers but only if completely anhydrous conditions are maintained. It is strongly recommended that the system be purged to dryness with dry air or inert gas to 35°F (dew point) prior to the introduction of titanium tetrachloride.

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XIV. DISPOSAL OF MATERIAL/CONTAINER

Material that cannot be used or chemically reprocessed and empty containers must be disposed of according to any applicable regulations. NOTE: State and local regulations may be more stringent than federal.

XV. PREPARATION INFORMATION

Prepared by: Product Stewardship, Akzo
Chemicals Inc., Chicago, Illinois,
(312)906-7500.

REFERENCES CITED:

American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values And Biological Exposure Indices With Intended Changes For 1988-89, ACGIH: Cincinnati, OH, 1988.

Kelly, D. P., Lee, K. P. and Burgess, B. A., "Inhalation Toxicity of Titanium Tetrachloride Atmospheric Hydrolysis Products," Toxicologist, 1: 76-77, 1981.

Lee, K. P., Kelly, D. P., Schneider, P. W. and Trocimowic, H. J., "Inhalation Toxicity Study on Rats Exposed to Titanium Tetrachloride Atmospheric Hydrolysis Products for Two Years," Toxicology and Applied Pharmacology, 83, 30-45, 1986.

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PHOSPHORIC ACID, LIQUID
PHOSPHORIC ACID, LIQUID
PHOSPHORIC ACID, LIQUID

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY NUMBER: (201) 796-7100
LHENTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

SUBSTANCE: **PHOSPHORIC ACID, LIQUID**

CAS-NUMBER 7664-38-2

TRADE NAMES/SYNONYMS:

WHITE PHOSPHORIC ACID; ORTHOPHOSPHORTIC ACID;
META-PHOS-META-PHOSPHORIC ACID; ORTHO-PHOSPHORIC ACID; SONAC; EVITS;
WC-REINIGER; STCC 4930248; UN 1805; A-280; A-242; A-388; A-385-P; H304P;
ACC188P1

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H3-P-O4

MOLECULAR WEIGHT: 98.00

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

COMPONENTS AND CONTAMINANTS

COMPONENT: PHOSPHORIC ACID

PERCENT: 88.0

COMPONENT: WATER

PERCENT: 15.0

EXPOSURE LIMITS:
PHOSPHORIC ACID:

1 MG/M3 OSHA TWA; 3 MG/M3 OSHA STEL
1 MG/M3 ACGIH TWA; 3 MG/M3 ACGIH STEL

8000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY
SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: ODOORLESS, COLORLESS SYRUPY LIQUID.

BOILING POINT: 316 F (158 C) MELTING POINT: 70 F (21 C)

SPECIFIC GRAVITY: 1.685 VAPOR PRESSURE: 2.2 MMHG @ 21 C

EVAPORATION RATE: NOT AVAILABLE PH: 1.5 @ 0.1N SOLN.

SOLUBILITY IN WATER: COMPLETE

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL

VISCOSITY: 28 CP @ 20 C

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLECTABLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM
(1980 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM
(1980 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING

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WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS (1980 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 60).

USE AGENT SUITABLE FOR TYPE OF FIRE. USE WATER IN FLOODING QUANTITIES AS FOR COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY 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 173.249
EXCEPTIONS: 49 CFR 173.244

TOXICITY

PHOSPHORIC ACID:
IRRITATION DATA: 595 MG/24 HOURS SKIN-RABBIT SEVERE; 119 MG EYE-RABBIT SEVERE.
TOXICITY DATA: 2740 MG/KG SKIN-RABBIT LD50; 1530 MG/KG ORAL-RAT LD50;
220 MG/KG UNREPORTED-MAN LDLO.

CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: MODERATELY TOXIC BY INGESTION; SLIGHTLY TOXIC BY DERMAL
ABSORPTION.

TARGET EFFECTS: NO DATA AVAILABLE.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING RESPIRATORY OR
SKIN DISEASE.

HEALTH EFFECTS AND FIRST AID

INHALATION:

PHOSPHORIC ACID:

CORROSIVE.

SEE INFORMATION ON ACIDIC CORROSIVE COMPOUNDS.

ACIDIC CORROSIVES:

ACUTE EXPOSURE- MAY CAUSE RESPIRATORY TRACT IRRITATION WITH COUGHING,
CHOKING, AND POSSIBLY BURNS OF THE MUCOUS MEMBRANES. OTHER INITIAL
SYMPTOMS MAY INCLUDE DIZZINESS, HEADACHE, NAUSEA AND WEAKNESS. IN SOME
CASES PULMONARY EDEMA MAY DEVELOP, EITHER IMMEDIATELY IN SEVERE CASES, OR
MORE LIKELY AFTER A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE
TIGHTNESS IN THE CHEST, DYSPNEA, FROTHY SPUTUM, AND CYANOSIS. PHYSICAL
FINDINGS MAY INCLUDE HYPOTENSION, WEAK, RAPID PULSE AND MOIST RALES.
RECOVERY MAY BE PROLONGED AND RELAPSES ARE POSSIBLE. IN SEVERE EXPOSURES,
DEATH DUE TO ANOXIA MAY OCCUR WITHIN A FEW HOURS AFTER ONSET OF PULMONARY
EDEMA SYMPTOMS OR FOLLOWING A RELAPSE.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE,
REPEATED OR PROLONGED EXPOSURE MAY CAUSE EROSION OF THE TEETH,
INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH, AND POSSIBLY JAW
NECROSIS. BRONCHIAL IRRITATION WITH COUGH AND FREQUENT ATTACKS OF
BRONCHIAL PNEUMONIA MAY OCCUR. GASTROINTESTINAL DISTURBANCES ARE ALSO
POSSIBLE.

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:

PHOSPHORIC ACID:

CORROSIVE.

SEE INFORMATION ON ACIDIC CORROSIVE COMPOUNDS.

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY
BROWNISH OR YELLOWISH STAINS. BURNS MAY BE DEEP WITH SHARP EDGES TO HEAL
SLOWLY WITH SCAR TISSUE FORMATION.
CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION
EXPOSURE. REPEATED OR PROLONGED CONTACT MAY RESULT IN DERMATITIS OR
EFFECTS SIMILAR TO ACUTE EXPOSURE.

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:

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**PHOSPHORIC ACID:
CORROSIVE.**

DIRECT CONTACT WITH A 0.18M SOLUTION BUFFERED TO PH 2.5 CAUSED A MODERATE, BRIEF STINGING SENSATION, BUT NO INJURY WHEN APPLIED AS A SINGLE DROP IN HUMAN EYES. WHEN ADJUSTED TO PH 3.4, A DROP OF THE SOLUTION CAUSED NO DISCOMFORT. IRRIGATION OF RABBIT EYES FOR 5 MINUTES WITH PH 3.8 SOLUTION CAUSED SLIGHT TRANSIENT EPITHELIAL EDEMA AND CONJUNCTIVAL HYPEREMIA, BUT THE EYE WAS NORMAL WITHIN 24 HOURS. WHEN INJECTED INTO THE CORNEAL STROMA OR APPLIED TO THE CORNEA AFTER REMOVAL OF THE EPITHELIUM, IT CAUSED DETECTABLE INJURY BELOW PH 3.5. EYE BURNS MAY RESULT FROM SPLASHES OF CONCENTRATED SOLUTIONS. SEE INFORMATION ON ACIDIC CORROSIVE COMPOUNDS.

ACIDIC CORROSIVES:

ACUTE EXPOSURE- DIRECT CONTACT MAY CAUSE PAIN, LACRIMATION, PHOTOPHOBIA AND BURNS. IN MILD BURNS, THE EPITHELIUM REGENERATES RAPIDLY AND THE EYE RECOVERS COMPLETELY. IN SEVERE CASES, THE EXTENT OF INJURY MAY NOT BE FULLY APPARENT FOR SEVERAL WEEKS. ULTIMATELY, THE WHOLE CORNEA MAY BECOME DEEPLY VASCULARIZED AND OPAQUE, RESULTING IN BLINDNESS. IN THE WORST CASES, THE EYE MAY BE TOTALLY DESTROYED.
CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT MAY CAUSE 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:

PHOSPHORIC ACID:

CORROSIVE.

SEE INFORMATION ON ACIDIC CORROSIVE COMPOUNDS.

ACIDIC CORROSIVES:

ACUTE EXPOSURE- MAY CAUSE CIRCUMORAL BURNS WITH DISCOLORATION AND CORROSION OF THE MUCOUS MEMBRANES OF THE MOUTH, THROAT AND ESOPHAGUS. THERE MAY BE IMMEDIATE PAIN AND DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. MARKED THIRST, NAUSEA, VOMITING AND DIARRHEA MAY OCCUR, DEPENDING ON THE AREA AND DEGREE OF CORROSION. THE VOMITUS MAY CONTAIN FRESH OR DARK BLOOD AND LARGE SHREDS OF MUCOSA. SHOCK MAY OCCUR WITH MARKED HYPOTENSION, WEAK AND RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN. CIRCULATORY COLLAPSE MAY DEVELOP AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, GASTRIC AND, TO A LESSER DEGREE, ESOPHAGEAL PERFORATION MAY OCCUR WITH PERITONITIS ACCOMPANIED BY FEVER AND ABDOMINAL RIGIDITY. ESOPHAGEAL, GASTRIC OR PYLORIC STRICTURE MAY OCCUR WITHIN A FEW WEEKS, OR MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE OR ASPIRATION OF EVEN MINUTE AMOUNTS. IF DEATH IS DELAYED, IT MAY BE DUE TO PERITONITIS, SEVERE NEPHRITIS OR PNEUMONIA. COMA AND CONVULSIONS SOMETIMES OCCUR TERMINALLY.
CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION MAY RESULT IN INFLAMMATORY AND ULCERATIVE CHANGES IN THE MUCOUS MEMBRANES OF THE MOUTH AND OTHER EFFECTS AS IN ACUTE INGESTION.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (OREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIP TO HELP PREVENT ASPIRATION.

REACTIVITY

REACTIVITY:

REACTS MILDLY WITH WATER AND EVOLVES HEAT.

INCOMPATIBILITIES:

PHOSPHORIC ACID:

BASES: VIOLENT REACTION.

FERROUS METALS AND ALLOYS: VERY CORROSIVE, ESPECIALLY WHEN HEATED.

GRANITE: ATTACKED BY HOT CONCENTRATED ACID.

METALS: REACTS WITH LIBERATION OF EXPLOSIVE HYDROGEN GAS.

NITROMETHANE: FORMS DETONABLE MIXTURE.
PLASTICS, RUBBER, COATINGS: MAY BE ATTACKED.
PORCELAIN: ATTACKED BY HOT CONCENTRATED ACID.
SODIUM TETRAHYDROBORATE: GENERATES HEAT AND MAY BE EXPLOSIVE ON RAPID MIXING.

DECOMPOSITION:

THERMAL DECOMPOSITION MAY RELEASE TOXIC OXIDES OF PHOSPHORUS.

POLYMERIZATION:

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

STORAGE AND DISPOSAL

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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****

PROTECT AGAINST PHYSICAL DAMAGE. STORE IN COOL, DRY, WELL VENTILATED LOCATION, AWAY FROM ANY AREA WHERE THE FIRE HAZARD MAY BE ACUTE (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, 40 CFR 262, EPA HAZARDOUS WASTE NUMBER D002, 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID**

MAY BURN BUT DOES NOT IGNITE EASILY. 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 HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

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

WATER USED TO KNOCK DOWN VAPORS MAY BECOME CORROSIVE OR TOXIC AND SHOULD BE CONTAINED PROPERLY FOR LATER DISPOSAL.

WATER SPILL:
NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM BICARBONATE.

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.

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).

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PROTECTIVE EQUIPMENT**

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION AND/OR GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

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).

PHOSPHORIC ACID:
25 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.
50 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.

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ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.

2000 MG/M3- ANY SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE 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 CANISTER WITH A
HIGH-EFFICIENCY PARTICULATE FILTER.
ANY 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:
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.

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