

**HYDROFLUORIC ACID, 49%*

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MATERIAL SAFETY DATA SHEET

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SUBSTANCE IDENTIFICATION

SUBSTANCE: **HYDROFLUORIC ACID, 49%*

CAS-NUMBER 7664-39-3

TRADE NAMES/SYNONYMS:
HYDROFLUORIC ACID, ANHYDROUS; FLUORHYDRIC ACID;
HYDROFLUORIC ACID, ANHYDROUS; ANTISAL 2B; HYDROFLUORIDE; A-146; A-147;
AC111170

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H-F MOL WT: 20.01

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

COMPONENTS AND CONTAMINANTS

COMPONENT: HYDROGEN FLUORIDE PERCENT: 49
COMPONENT: WATER PERCENT: 51
OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
HYDROGEN FLUORIDE:
2 MG/M3 OSHA TWA;
2.5 MG(F)/M3 ACGIH CEILING;
2.5 MG(F)/M3 NIOSH RECOMMENDED 10 HOUR TWA;
5 MG(F)/M3 NIOSH RECOMMENDED 15 MINUTE CEILING
100 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY
100 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

PHYSICAL DATA

DESCRIPTION: COLORLESS, FUMING LIQUID WITH A PUNGENT ODOR.
 BOILING POINT: 226 F (108 C) MELTING POINT: NO REPORTS FOUND
 SPECIFIC GRAVITY: 1.1-1.2 VAPOR PRESSURE: 10 MMHG @ 20 C PH: ACIDIC
 SOLUBILITY IN WATER: COMPLETE ODOR THRESHOLD: 0.3 PPM VAPOR DENSITY: 0.7

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
 SLIGHT FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.
 FLASH POINT: NONFLAMMABLE
 FIREFIGHTING MEDIA:
 DRY CHEMICAL OR CARBON DIOXIDE
 (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).
 FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM
 (1984 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3).

FIREFIGHTING:

DO NOT GET WATER INSIDE CONTAINER! MOVE CONTAINER FROM FIRE AREA IF POSSIBLE.
 STAY AWAY FROM STORAGE TANK ENDS. COOL FIRE-EXPOSED CONTAINERS WITH WATER FROM
 SIDE UNTIL WELL AFTER FIRE IS OUT. ISOLATE AREA UNTIL GAS HAS DISPERSED (1984
 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.3, GUIDE PAGE 15).

USE AGENT SUITABLE FOR TYPE OF FIRE; USE WATER IN FLOODING QUANTITIES AS A FOG
 COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE
 AS POSSIBLE. IN CASE OF LEAK EVACUATE FOR RADIUS OF 2500 FT. AVOID BREATHING
 CORROSIVE VAPORS.

TOXICITY

110 PPM/1 MINUTE INHALATION-MAN LC10; 50 PPM/30 MINUTES INHALATION-HUMAN LC10;
 1276 PPM/1 HOUR INHALATION-RAT LC50; 1774 PPM/1 HOUR INHALATION-MONKEY LC50;
 25 MG/KG INTRAPERITONEAL-RAT LDLO; 112 MG/KG SUBCUTANEOUS-FROG LDLO;
 MUTAGENIC DATA (RTECS); REPRODUCTIVE DATA (RTECS); CARCINOGEN STATUS: NONE.
 HYDROGEN FLUORIDE IS A HIGHLY TOXIC, SEVERE EYE, MUCOUS MEMBRANE AND SKIN
 IRRITANT. ACUTE POISONING AFFECTS THE BRAIN, KIDNEYS, CARDIOVASCULAR,
 NEUROMUSCULAR, AND GASTROINTESTINAL SYSTEMS. CHRONIC EXPOSURE MAY PRODUCE
 FLUOROSIS OF SKELETAL SYSTEM.

HEALTH EFFECTS AND FIRST AID

INHALATION:
 CORROSIVE/HIGHLY TOXIC. 20 PPM IMMEDIATELY DANGEROUS TO LIFE AND HEALTH.
 ACUTE EXPOSURE- MAY CAUSE TRANSIENT CHOKING, COUGHING, SPITTING BLOOD,
 PAIN BEHIND THE BRESTBONE AND DYSPNEA. AN ASYMPTOMATIC

PERIOD OF 1-2 DAYS MAY BE FOLLOWED BY FEVER, COUGH, DYSPNEA, CYANOSIS, AND PULMONARY EDEMA OR BRONCHOPNEUMONIA. HIGH LEVELS MAY CAUSE ULCERATIVE TRACHEBRONCHITIS AND HEMORRHAGIC PULMONARY EDEMA. DEATH FROM PULMONARY EDEMA OCCURRED WITHIN 2 HOURS IN 3 OF 6 WORKERS SPLASHED WITH A 70% SOLUTION, DESPITE PROMPT SHOWERING.

CHRONIC EXPOSURE- VAPORS MAY CAUSE ULCERS OF UPPER RESPIRATORY TRACT. ABSORPTION MAY CAUSE CRIPPLING FLUOROSIS OR OSTEOSCLEROSIS DUE TO FLUORIDE DEPOSITION IN THE BONE. WEIGHT LOSS, BRITTLENESS OF BONES, ANEMIA, REDUCED BONE MARROW SPACE, GENERAL ILL HEALTH, STIFFNESS OF JOINTS, AND DISCOLORATION OF DEVELOPING TEETH MAY OCCUR. SEE MUTAGENIC AND REPRODUCTIVE (ANIMAL STUDIES) REFERENCES IN TOXICITY SECTION.

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. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

CORROSIVE.
ACUTE EXPOSURE- CAUSES PAINFUL AND MEDICALLY SERIOUS BURNS. FOR CONCENTRATIONS LESS THAN 20%, PAIN AND ERYTHEMA MAY OCCUR AFTER A LATENT PERIOD OF 24 HOURS. FOR 20-50% SOLUTIONS, BURNS MAY BE APPARENT WITHIN 1-8 HOURS. FOR >50% CONCENTRATIONS, IMMEDIATE PAIN AND RAPIDLY APPARENT TISSUE DAMAGE OCCUR ON CONTACT.

CHRONIC EXPOSURE- MAY CAUSE IRRITATION OR BURNS. FLUOROSIS MAY OCCUR FROM PROLONGED ABSORPTION.

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:
CORROSIVE/HIGHLY TOXIC.
ACUTE EXPOSURE- LIQUID CONTACT WITH EYES CAN CAUSE IMMEDIATE BLINDNESS. VAPOR EXPOSURE MAY CAUSE SEVERE IRRITATION OR BURNS TO THE EYES AND EYELIDS WHICH MAY RESULT IN PROLONGED OR PERMANENT VISUAL DEFECTS OR PERMANENT DESTRUCTION OF THE EYES.

CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE TO LOW VAPOR LEVELS MAY CAUSE CONJUNCTIVITIS.

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). IN CASE OF BURNS, APPLY STERILE BANDAGES LOOSELY WITHOUT MEDICATION. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
CORROSIVE.
ACUTE EXPOSURE- CORROSIVE EFFECTS CAUSE BURNS OF MOUTH, ESOPHAGUS, STOMACH

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AND SMALL INTESTINE WITH GASTRITIS, GASTRIC HEMORRHAGES, NAUSEA, VOMITING, ABDOMINAL PAIN AND DIARRHEA. SYSTEMIC POISONING MAY CAUSE HYPOMAGNESEMIA AND HYPOCALCEMIA RESULTING IN TETANY ESPECIALLY OF EXTREMITIES, MUSCLE SPASMS, CONVULSIONS AND PARASTHESIAS, HYPOTENSION, CIRCULATORY SHOCK, SINUS TACHYCARDIA, CARDIAC ARRHYTHMIAS, OR MULTIPLE ATTACKS OF VENTRICULAR FIBRILLATION AND DEATH FROM CARDIAC COLLAPSE. CENTRAL NERVOUS SYMPTOMS INCLUDE HEADACHE, EXCESSIVE SALIVATION, NYSTAGMUS AND DILATED PUPILS, LETHARGY, STUPOR, AND COMA, OR OCCASIONAL CONVULSIONS WITH POSSIBLE DEATH FROM RESPIRATORY FAILURE OF CENTRAL ORIGIN. IN NON-FATAL CASES, JAUNDICE AND KIDNEY DAMAGE WITH OLIGURIA, ALBUMINURIA, HEMATURIA OR ANURIA MAY OCCUR, BUT ARE GENERALLY REVERSIBLE.

FIRST AID- IF VICTIM IS CONSCIOUS, GIVE LARGE QUANTITIES OF WATER IMMEDIATELY TO DILUTE THE ACID. DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION IMMEDIATELY.

REACTIVITY

REACTIVITY:
REACTS EXOTHERMICALLY WITH WATER WITH RELEASE OF CORROSIVE FUMES.

INCOMPATIBILITIES:
DIFFICULT TO CONTAIN, HIGHLY CORROSIVE TO GLASS, OTHER SILICEOUS MATERIALS, MOST METALS AND OTHER MATERIALS EXCEPT LEAD, WAX, POLYETHYLENE AND PLATINUM. MAY GENERATE FLAMMABLE HYDROGEN GAS IN CONTACT WITH SOME METALS. REACTS EXPLOSIVELY WITH CYANOGEN FLUORIDE. INCANDESCENT REACTION WITH ARSENIC TRIOXIDE OR CALCIUM OXIDE. EXOTHERMIC TO VIOLENT REACTIONS WITH PHOSPHORUS PENTOXIDE, ACETIC ANHYDRIDE, 2-AMINO ETHANOL, AMMONIUM HYDROXIDE, BISMUTHIC ACID, CHLOROSULFONIC ACID, ETHYLENEDIAMINE, ETHYLENE IMINE, FLUORINE, NITRIC ACID + LACTIC ACID, OLEUM, BETA PROPIOLACTONE, PROPYLENE OXIDE, SODIUM, SODIUM HYDROXIDE, SULFURIC ACID, VINYL ACETATE, MERCURY OXIDE, SODIUM OR POTASSIUM TETRAFLUOROSILICATE, TETRAFLUOROSILICIC ACID, OR N-PHENYL AZOPIPERIDINE. CONTACT WITH WATER WILL PRODUCE AN EXOTHERMIC REACTION AND RELEASE CORROSIVE FUMES.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE CORROSIVE HYDROGEN FLUORIDE.

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

CONDITIONS TO AVOID

CONTAINER MAY EXPLODE IN HEAT OF FIRE.

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. **HYDROFLUORIC ACID, 49%*

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USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

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

AIR SPILL:
APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT.

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

NEUTRALIZE WITH CAUSTIC SODA.

ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:
STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS BUT DO NOT PUT WATER ON LEAK OR SPILL AREA. DO NOT GET WATER INSIDE CONTAINER. ISOLATE AREA UNTIL GAS HAS DISPERSED. FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING. EVACUATE AREA ENDANGERED BY GAS.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:
15 MG(F)/M3- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE, OR EQUIVALENT RESPIRATOR.

ESCAPE- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

FIREFIGHTING- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE 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.

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

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