

**HYDROCHLORIC ACID, 36-3

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MATERIAL SAFETY DATA SHEET

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

EMERGENCY CONTACTS
GASTON L. PILLORI
(201) 796-7100

DATE 07/29/87
PO NBR: QB09331
ACCT: 888250-01
INDEX: 05872050115
CAT NO: A1449212

MS DS
SENT TO
SAFETY OFFICER
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SUBSTANCE IDENTIFICATION

CAS-NUMBER 7647-01-0

SUBSTANCE: **HYDROCHLORIC ACID, 36-37%**

TRADE NAMES/SYNONYMS:

CHLOROHYDRIC ACID; HYDROCHLORIDE; MURIATIC ACID; SPIRITS OF SALT; UN 1789;
ACC11155

CHEMICAL FAMILY:
INORGANIC ACID

MOLECULAR FORMULA: H-CL MOL WT: 36.46

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

COMPONENTS AND CONTAMINANTS

COMPONENT: HYDROGEN CHLORIDE PERCENT: 36-37
CAS 7647-01-0

COMPONENT: WATER PERCENT: 63-64

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
5 PPM OSHA CEILING; 5 PPM ACGIH CEILING

PHYSICAL DATA

DESCRIPTION: COLORLESS OR SLIGHTLY YELLOW FUMING LIQUID WITH A PUNGENT ODOR

BOILING POINT: 384 F (196 C) SPECIFIC GRAVITY: 1.2

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VAPOR PRESSURE: NOT AVAILABLE PH: 1.1 (0.1 N)

SOLUBILITY IN WATER: SOLUBLE-EVOLVES HEAT VAPOR DENSITY: 1.3

FIRE AND EXPLOSION DATA

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

FLASH POINT: NON-COMBUSTIBLE

FIREFIGHTING MEDIA:
DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR FOAM
(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:
MOVE CONTAINERS FROM FIRE AREA IF POSSIBLE. COOL CONTAINERS EXPOSED TO FLAMES
WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT (1984 EMERGENCY RESPONSE
GUIDEBOOK, DOT P 5800.3).

EXTINGUISH USING AGENTS SUITABLE FOR TYPE OF FIRE. USE FLOODING AMOUNTS OF
WATER AS FOG. DO NOT SPRAY WATER DIRECTLY ON HYDROCHLORIC ACID. COOL
CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS
POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND. (BUREAU OF
EXPLOSIVES, EMERGENCY HANDLING OF HAZARDOUS MATERIALS IN SURFACE
TRANSPORTATION, 1981).

TOXICITY

1300 PPM/30 MINUTES INHALATION-HUMAN LCLO; 81 MG/KG UNKNOWN-MAN LDLO;
3124 PPM/1 HOUR INHALATION-RAT LC50; 2124 PPM/30 MINUTES INHALATION-MOUSE
LC50; 900 MG/KG ORAL-RABBIT LD50; 40 MG/KG INTRAPERITONEAL-MOUSE LD50;
MUTAGENIC DATA (RTECS); CARCINOGEN STATUS: NONE.
HYDROCHLORIC ACID IS A SEVERE EYE, MUCOUS MEMBRANE, AND SKIN IRRITANT.

HEALTH EFFECTS AND FIRST AID

INHALATION:

CORROSIVE. 100 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- EXPOSURE TO GAS OR FUMES MAY CAUSE IMMEDIATE COUGHING,
BURNING OF THE THROAT OR NOSE, CHOKING, DIZZINESS, WEAKNESS AND DIFFICULTY
SWALLOWING. EXPOSURE ABOVE 5 PPM MAY BE FOLLOWED BY INFLAMMATION AND
OCCASIONAL ULCERATION OF THE NOSE, THROAT OR LARYNX; LARYNGITIS, BRONCHI-
TIS, PNEUMONIA, HEADACHE, PALPITATIONS, DENTAL EROSION, OR NASAL SEPTUM
PERFORATION. CONCENTRATIONS ABOVE 50 PPM MAY BE FOLLOWED BY BLEEDING OF
THE NOSE AND GUMS. FOLLOWING A 6-8 HOUR LATENCY PERIOD, LARYNGEAL SPASM OR
PULMONARY EDEMA WITH TIGHTNESS IN THE CHEST, AIR HUNGER, DIZZINESS, FROTHY
SPUTUM AND CYANOSIS MAY OCCUR. SHORTNESS OF BREATH AND EXPECTORATION OF
BLOOD MAY OCCUR FOR SEVERAL WEEKS FOLLOWING A SINGLE EXPOSURE. PYLORIC
OBSTRUCTION MAY DEVELOP. SEVERE EXPOSURE MAY CAUSE CIRCULATORY SHOCK,
ASPHYXIATION, GASTRIC HEMORRHAGE, INFECTION, CYANOSIS AND DEATH.

CHRONIC EXPOSURE- MAY CAUSE EROSION OF TEETH FOLLOWED BY JAW NECROSIS, BRONCHIAL IRRITATION WITH CHRONIC COUGH, FREQUENT ATTACKS OF BRONCHIAL PNEUMONIA, SKIN TENDERNESS, GASTROINTESTINAL DISTURBANCES OR MUCOUS MEMBRANE IRRITATION WHICH MAY MIMIC VIRAL INFECTION OF THE UPPER RESPIRATORY TRACT CHARACTERIZED BY FEVER AND MUSCLE TENDERNESS. SEE ANIMAL MUTAGENIC 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- DIRECT CONTACT MAY CAUSE SEVERE PAIN AND BROWNISH OR YELLOW STAINS. BURNS MAY BE DEEP WITH SHARP EDGES AND HEAL SLOWLY WITH SCAR TISSUE FORMATION. SKIN BURNS ARE FREQUENTLY FOLLOWED BY EXTENSIVE SCARRING.

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

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES, DIRECTING A STREAM OF WATER UNDER CLOTHING WHILE IT IS BEING REMOVED. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). IN CASE OF BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION.

EYE CONTACT:
CORROSIVE.

ACUTE EXPOSURE- VAPORS WHICH ESCAPE FROM THE AQUEOUS SOLUTION ARE IMMEDIATELY IRRITATING TO THE EYES. THE SUBSTANCE IS SO IRRITATING THAT HUMANS HAVE RARELY SUBMITTED TO DAMAGING CONCENTRATIONS. HOWEVER, IN ANIMALS, 1350 PPM IN AIR FOR 1.5 HOURS HAS CAUSED CLOUDING OF THE CORNEA AND 300 PPM FOR 6 HOURS HAS CAUSED SLIGHT EROSION OF THE CORNEAL EPITHELIUM. CONTACT WITH THE LIQUID MAY CAUSE CONJUNCTIVAL FLUID BUILD-UP (EDEMA) AND CORNEAL DESTRUCTION WITH PAIN, LACRIMATION, BLURRED VISION AND PHOTSENSITIZATION. SEVERITY OF DAMAGE DEPENDS ON THE QUANTITY, CONCENTRATION AND DURATION OF CONTACT. IN HUMANS THE EFFECTS HAVE RANGED FROM REDNESS AND IRRITATION OF THE CONJUNCTIVA TO TOTAL CORNEAL OPACIFICATION AND LOSS OF THE EYE. RARELY, LENS OPACITY MAY OCCUR. MOST COMMONLY, A DROP OF THE LIQUID SPLASHED IN THE EYE AND IMMEDIATELY WASHED OUT WITH WATER MAY CAUSE WHITE COAGULATION OF THE CORNEAL AND CONJUNCTIVAL EPITHELIUM. CORNEAL SLOUGHING MAY OCCUR WITHIN A FEW DAYS AND THE EYE RETURNS TO NORMAL. 2% AQUEOUS SOLUTION OF HYDROCHLORIC ACID HAS BEEN APPLIED TO HUMAN EYES FOR A FEW SECONDS WITHOUT SIGNIFICANT INJURY. THE LIQUID IS INJURIOUS TO RABBIT CORNEAS AT PH LESS THAN 3. SOLUTIONS OF 0.25 N TO 1 N HAVE CAUSED SCARRING OF RABBIT CORNEAS.

CHRONIC EXPOSURE- PROLONGED VAPOR CONTACT MAY CAUSE CONJUNCTIVITIS. 100 PPM FOR SIX HOURS DAILY FOR FIFTY DAYS CAUSED SLIGHT UNREST AND EYE IRRITATION BUT NO INJURY IN RABBITS. THE LIQUID MAY CAUSE CORNEAL DAMAGE AND SCARRING.

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- MAY CAUSE BURNS OF MOUTH, ESOPHAGUS, AND STOMACH WITH CONSEQUENT PAIN, NAUSEA, SALIVATION, VOMITING, CHILLS, SHOCK AND THIRST. MAY CAUSE ULCERATION OF ALL MEMBRANES AND TISSUES WHICH THE ACID CONTACTS. ASPHYXIA OR NEPHRITIS MAY OCCUR. AFTER INITIAL RECOVERY, FEVER MAY INDICATE PERFORATION OF THE ESOPHAGUS OR STOMACH. IN SEVERE CASES, CIRCULATORY COLLAPSE MAY OCCUR WHICH, IF NOT CORRECTED, MAY LEAD TO RENAL, LIVER OR HEART FAILURE.

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

REACTIVITY

REACTIVITY:

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES. FORMS DENSE, CHOKING FUMES ON EXPOSURE TO AIR.

INCOMPATIBILITIES:

ALCOHOLIC HYDROGEN CYANIDE: EXPLOSIVE REACTION.
TETRASELENIUM TETRANITRIDE: EXPLOSIVE REACTION.
SODIUM: EXPLOSIVE REACTION.
POTASSIUM PERMANGANATE: EXPLOSIVE REACTION.
SULFURIC ACID: EXPLOSIVE REACTION.
PERCHLORIC ACID: VIOLENT REACTION.
ACETIC ANHYDRIDE, 2-AMINOETHANOL, 28% AMMONIA, CHLOROSULFONIC ACID, ETHYLENE-DIAMINE, ETHYLENEIMINE, OLEUM, PROPIOLACTONE (BETA-), PROPYLENE OXIDE, SODIUM HYDROXIDE OR VINYL ACETATE: INCREASED TEMPERATURE AND PRESSURE IN A CLOSED CONTAINER.
FLUORINE: IGNITES.
CESIUM CARBIDE: IGNITES.
CESIUM ACETYLIDE: IGNITES.
RUBIDIUM CARBIDE: IGNITES.
RUBIDIUM ACETYLIDE: IGNITES.
URANIUM DICARBIDE: IGNITES.
OXYGEN + PLATINUM: IGNITES.
LITHIUM SILICIDE: INCANDESCENCE.
ALUMINUM: VIGOROUS EXOTHERMIC REACTION.
CALCIUM PHOSPHIDE: VIGOROUS EXOTHERMIC REACTION.
URANIUM PHOSPHIDE: PRODUCES EXPLOSIVE OR FLAMMABLE PHOSPHINE.
SILVER PERCHLORATE + CARBON TETRACHLORIDE: PRODUCES EXPLOSIVE OR FLAMMABLE TRICHLOROMETHYL PERCHLORATE.
METALS: PRODUCES EXPLOSIVE OR FLAMMABLE HYDROGEN GAS.
MAGNESIUM BORIDE: PRODUCES EXPLOSIVE OR FLAMMABLE PRODUCT.
DOWICIL 100: DECOMPOSES DOWICIL 100.
WATER: EXOTHERMIC REACTION GENERATING FUMES OF HYDROGEN CHLORIDE.

DECOMPOSITION:

HEATING RELEASES INCREASING AMOUNTS OF HYDROGEN CHLORIDE.

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

CONDITIONS TO AVOID

CONTACT WITH OR STORAGE WITH INCOMPATIBLE MATERIALS LISTED ABOVE AND EXCESSIVE
HEAT.

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 OR FLY ASH TO ABSORB LIQUID MASS.

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.

OCCUPATIONAL SPILL:
BE SURE TO WEAR PROTECTIVE EQUIPMENT BEFORE ENTERING SPILL AREA OR APPROACHING
SPILL. SEE PROTECTIVE EQUIPMENT SECTION. HYDROCHLORIC ACID IN CONTACT WITH
SOME INCOMPATIBLE MATERIALS MAY RELEASE FLAMMABLE AND/OR EXPLOSIVE REACTION
PRODUCTS. SEE INFORMATION IN REACTIVITY SECTION.

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 AS CLOSE TO THE SOURCE OF THE SPILL AS IS
PRACTICAL AND EFFECTIVE, IN ORDER TO REDUCE THE AREA CONTAMINATED AND THE
AMOUNT OF MATERIAL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE
HAZARD AREA AND DENY ENTRY.

PROTECTIVE EQUIPMENT

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

RESPIRATOR:

EXPOSURE LIMIT TO 50 PPM(HCL)-CHEMICAL CARTRIDGE RESPIRATOR WITH AN ACID GAS CARTRIDGE.
SUPPLIED-AIR RESPIRATOR.
SELF-CONTAINED BREATHING APPARATUS.

100 PPM (HCL)- SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE, OR USE EQUIVILANT RESPIRATOR.
ESCAPE- GAS MASK WITH AN ACID GAS FILTER.
SELF-CONTAINED BREATHING APPARATUS.

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-PROOF SAFETY GOGGLES TO PREVENT THIS SUBSTANCE FROM CONTACTING THE EYES. DO NOT WEAR CONTACT LENSES WHEN WORKING WITH CHEMICALS.

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-ADDITIONAL INFORMATION-

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