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LACTIC ACID
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MATERIAL SAFETY DATA SHEET

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

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

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SUBSTANCE IDENTIFICATION

SUBSTANCE: **LACTIC ACID**

CAS-NUMBER 50-21-5

TRADE NAMES/SYNONYMS:

ACETONIC ACID; DL-LACTIC ACID; ETHYLIDENELACTIC ACID;
1-HYDROXYETHANECARBOXYLIC ACID; 2-HYDROXYPROPANOIC ACID; MILK ACID;
ORDINARY LACTIC ACID; LACTIC ACID-DL; ALPHA-HYDROXYPROPIONIC ACID;
2-HYDROXYPROPIONIC ACID; RACEMIC LACTIC ACID; LC-HYDROXYPROPANOIC ACID;
A-159; A-162; ACC12400

CHEMICAL FAMILY:
CARBOXYLIC ACID, ALIPHATIC

MOLECULAR FORMULA: C3-H6-O3 MOL WT: 90.08

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

COMPONENTS AND CONTAMINANTS

COMPONENT: LACTIC ACID PERCENT: 100
CAS# 50-21-5

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
NO OCCUPATIONAL EXPOSURE LIMITS ESTABLISHED BY OSHA, ACGIH, OR NIOSH.

PHYSICAL DATA

DESCRIPTION: ODORLESS, HYGROSCOPIC YELLOW CRYSTALS OR LIQUID

BOILING POINT: 252 F (122 C) MELTING POINT: 64 F (18 C)

SPECIFIC GRAVITY: 1.2 VAPOR PRESSURE: 19 MMHG @ 38 C

SOLUBILITY IN WATER: SOLUBLE ODOR THRESHOLD: <1.0 PPM

SOLVENT SOLUBILITY: ALCOHOL, ETHER, FURFUROL, GLYCEROL, GLYCERIN

FIRE AND EXPLOSION DATA

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

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 (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 60).

EXTINGUISH USING AGENT INDICATED; DO NOT USE WATER DIRECTLY ON MATERIAL.
IF LARGE AMOUNTS OF COMBUSTIBLE MATERIALS ARE INVOLVED, USE WATER SPRAY OR FOG IN FLOODING AMOUNTS. AVOID BREATHING CORROSIVE DUSTS AND FUMES FROM BURNING MATERIAL, KEEP UPWIND.

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TOXICITY

LACTIC ACID:
500 MG/24 HOURS SKIN-RABBIT SEVERE IRRITATION; 750 UG EYE-RABBIT SEVERE IRRITATION; 750 UG/24 HOURS EYE-RABBIT SEVERE IRRITATION; 3730 MG/KG ORAL-RAT LD50; 4875 MG/KG ORAL-MOUSE LD50; 4500 MG/KG SUBCUTANEOUS-MOUSE LD50; 500 MG/KG ORAL-RABBIT LDLO; 1200 MG/KG RECTAL-RABBIT LDLO; 1810 MG/KG ORAL-GUINEA PIG LD50; MUTAGENIC DATA (RTECS); CARCINOGEN STATUS: NONE.
LACTIC ACID IS A SEVERE EYE, SKIN AND MUCOUS MEMBRANE IRRITANT. THE FOOD AND DRUG ADMINISTRATION LISTS THIS SUBSTANCE AS A DIRECT FOOD SUBSTANCE AFFIRMED AS GENERALLY RECOGNIZED AS SAFE.

HEALTH EFFECTS AND FIRST AID

INHALATION:
LACTIC ACID:

CORROSIVE.
ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION WITH COUGHING, CHOKING, AND VARIABLE SYMPTOMS OF HEADACHE, DIZZINESS, WEAKNESS, AND PULMONARY EDEMA WITH TIGHTNESS IN THE CHEST, AIR HUNGER, DIZZINESS, FROTHY SPUTUM AND CYANOSIS. OTHER SYMPTOMS INCLUDE MOIST RALES, LOW BLOOD PRESSURE, AND HIGH PULSE PRESSURE. HEMOPTYSIS AND SHORTNESS OF BREATH MAY CONTINUE FOR SEVERAL WEEKS AFTER A SINGLE EXPOSURE.
CHRONIC EXPOSURE- MAY CAUSE GASTROINTESTINAL DISTURBANCES, EROSION OF THE TEETH, JAW NECROSIS, BRONCHIAL IRRITATION WITH CHRONIC COUGH AND FREQUENT ATTACKS OF BRONCHIAL PNEUMONIA.

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:
LACTIC ACID:

CORROSIVE.
ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION WITH REDNESS, PAIN AND BROWNISH OR YELLOWISH STAINS. BURNS MAY PENETRATE THE FULL THICKNESS OF THE SKIN WITH SHARPLY DEFINED EDGES, AND MAY HEAL SLOWLY WITH SCAR FORMATION.
CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT MAY CAUSE 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 (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:
LACTIC ACID:

CORROSIVE.
ACUTE EXPOSURE- MAY CAUSE SEVERE IRRITATION WITH REDNESS, PAIN, TEARING, BLURRED VISION, PHOTOPHOBIA, CONJUNCTIVAL EDEMA AND CORNEAL DESTRUCTION. CONCENTRATED LACTIC ACID, APPLIED TO A RABBIT'S EYES WITH IRRIGATION, CAUSED NECROSIS AND LOSS OF THE SUPERFICIAL LAYERS OF THE CORNEA, THREATENING PERFORATION. IN THE ANTERIOR CHAMBER WAS HYPOPYON AND ADHESION OF THE IRIS TO THE CORNEA IN THE PERIPHERY. THE CORNEAL EPITHELIUM WAS GONE AND VESSELS WERE GROWING INTO THE REMAINING CORNEA. THE LENS HAD ANTERIOR OPACITY AND DESTRUCTION OF EPITHELIAL CELLS ANTERIORLY.
CHRONIC EXPOSURE- REPEATED AND PROLONGED CONTACT 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). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
LACTIC ACID:

CORROSIVE.
ACUTE EXPOSURE- LARGE AMOUNTS OR EVEN DILUTE SOLUTIONS OF LACTIC ACID MAY CAUSE SEVERE GASTROINTESTINAL IRRITATION WITH BURNING OF THE MOUTH,

PHARYNX AND ABOOMEN FOLLOWED BY VOMITING, AND DIARRHEA. DARK PRECIPITATED BLOOD. THE BLOOD PRESSURE MAY FALL SHARPLY. BROWNISH OR YELLOWISH STAINS MAY BE FOUND AROUND THE MOUTH. ASPHYXIA MAY OCCUR FROM EDEMA OF THE GLOTTIS. AFTER THE INITIAL RECOVERY, ONSET OF FEVER MAY INDICATE MEDIASTINITIS OR PERITONITIS FROM PERFORATION OF THE ESOPHAGUS OR THE STOMACH. HOWEVER, THE PATIENT MAY HAVE A RIGID ABDOMEN WITHOUT PERFORATION. IF THE PATIENT RECOVERS FROM THE IMMEDIATE DAMAGE, SCAR FORMATION IS MORE LIKELY TO PRODUCE STRICTURE OF THE PYLORUS THAN STRICTURE OF THE ESOPHAGUS.
CHRONIC EXPOSURE- THE FOOD AND DRUG ADMINISTRATION LISTS LACTIC ACID AS A DIRECT FOOD SUBSTANCE AFFIRMED AS GENERALLY RECOGNIZED AS SAFE.

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

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100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

STABILITY:
STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES:
ACIDIC ACID:
NITRIC ACID + HYDROFLUORIC ACID: CONTACT MAY CAUSE EXPLOSION.
METALS: LACTIC ACID MAY CAUSE CORROSION.
SUPERHEATED STEAM: CAUSES LACTIC ACID TO BECOME VOLATILE.
OXIDIZING AGENTS: PHARMACOLOGICAL INCOMPATIBILITY.
IODIDES: PHARMACOLOGICAL INCOMPATIBILITY.
NITRIC ACID: PHARMACOLOGICAL INCOMPATIBILITY.
ALBUMIN: PHARMACOLOGICAL INCOMPATIBILITY.

DECOMPOSITION:
ACIDIC ACID:
THERMAL DECOMPOSITION RELEASES TOXIC OXIDES OF CARBON AND SMOKE AND SOOT.

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

CONDITIONS TO AVOID

DO NOT BURN BUT DOES NOT IGNITE READILY. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. MAY IGNITE COMBUSTIBLES (WOOD, PAPER, OIL, ETC.).

SPILL AND LEAK PROCEDURES

OIL 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.

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

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

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

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.

WEEP UP MATERIAL AND PLACE IN CONTAINER FOR DISPOSAL. WASH AREA WITH FLOODING QUANTITIES OF WATER.

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST OR GENERAL DILUTION VENTILATION SYSTEM.

RESPIRATOR:
THE FOLLOWING RESPIRATORS ARE RECOMMENDED BASED ON INFORMATION FOUND IN THE PHYSICAL DATA, TOXICITY AND HEALTH EFFECTS SECTIONS. THEY ARE RANKED IN ORDER FROM MINIMUM TO MAXIMUM RESPIRATORY PROTECTION.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST BE BASED ON THE SPECIFIC OPERATION, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND MUST BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

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

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ANY GAS MASK WITH ORGANIC VAPOR CANISTER (CHIN-STYLE OR FRONT- OR BACK-MOUNTED CANISTER), WITH A FULL FACEPIECE, PROVIDING PROTECTION AGAINST ACID GASES.

ANY TYPE 'C' SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE OR WITH A FULL FACEPIECE, HELMET OR HOOD OPERATED IN CONTINUOUS-FLOW MODE.

ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

ANY SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ANY 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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