

DATE: 08/14/93 ACCT: 888235-01  
INDEX: N/A CAT NO: A104500 PO NBR: N/A

\*\*HYDROUS CITRIC ACID\*\*  
\*\*HYDROUS CITRIC ACID\*\*  
\*\*HYDROUS CITRIC ACID\*\*

## 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

THIS INFORMATION IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.

## SUBSTANCE IDENTIFICATION

SUBSTANCE: \*\*HYDROUS CITRIC ACID\*\* CAS-NUMBER 5949-29-1

TRADE NAMES/SYNONYMS:  
1,2,3-PROPANETRICARBOXYLIC ACID, 2-HYDROXY-, MONOHYDRATE;  
2-HYDROXY-1,2,3-PROPANETRICARBOXYLIC ACID MONOHYDRATE;  
CITRIC ACID, MONOHYDRATE; CITRIC ACID MONOHYDRATE;  
NEUTRALIZER FOR ALKALINES (MALLINCKRODT); A104; A110; C6H10O8; ACC84211

CHEMICAL FAMILY:  
CARBOXYLIC ACID, ALIPHATIC

MOLECULAR FORMULA: H-O2-C3-H2-(O-H)-C-O2-H-C-H2-C-O2-H.H2-O

MOLECULAR WEIGHT: 210.14

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

## COMPONENTS AND CONTAMINANTS

COMPONENT: HYDROUS CITRIC ACID PERCENT: 100.0  
CAS# 5949-29-1

OTHER CONTAMINANTS: NONE

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

## PHYSICAL DATA

DESCRIPTION: ODORLESS, COLORLESS, ORTHORHOMBIC PRISMS WITH PLEASANT, SOUR

TASTE. EFFLORESCENT IN DRY AIR; SLIGHTLY DELIQUESCENT IN MOIST AIR.

MELTING POINT: 212 F (100 C) SPECIFIC GRAVITY: 1.542

PH: 2.2 @ 0.1 N SOLN SOLUBILITY IN WATER: COMPLETE

SOLVENT SOLUBILITY: SOLUBLE IN AMYL ALCOHOL, METHANOL AND PROPANOL;  
MODERATELY SOLUBLE IN AMYL ACETATE, ETHYL ACETATE AND ETHER; VERY SLIGHTLY  
SOLUBLE IN CHLOROFORM.

LOSES WATER OF CRYSTALLIZATION AT ABOUT 104-122 F (40-50 C)

## FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:  
SLIGHT 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. DO NOT SCATTER  
SPILLED MATERIAL WITH HIGH-PRESSURE WATER STREAMS. DIKE FIRE-CONTROL WATER FOR  
LATER DISPOSAL (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE  
PAGE 31).

DATE: 08/14/93 ACCT: 888235-01  
INDEX: N/A CAT NO: A104500 PO NBR: N/A

USE AGENTS SUITABLE FOR TYPE OF SURROUNDING FIRE. AVOID BREATHING HAZARDOUS  
VAPORS. KEEP UPWIND.

## TOXICITY

CITRIC ACID:  
IRRITATION DATA:  
ANHYDROUS: 500 MG/24 HOURS SKIN-RABBIT MILD; 750 UG/24 HOURS EYE-RABBIT  
SEVERE.  
MONOHYDRATE: 5 MG/30 SECONDS RINSED EYE-RABBIT MILD.  
TOXICITY DATA:  
ANHYDROUS: 5040 MG/KG ORAL-MOUSE LD50; 7000 MG/KG ORAL-RABBIT LD50;  
42 MG/KG INTRAVENOUS-MOUSE LD50; 330 MG/KG INTRAVENOUS-RABBIT LD50;  
883 MG/KG INTRAPERITONEAL-RAT LD50; 903 MG/KG INTRAPERITONEAL-MOUSE LD50;  
5500 MG/KG SUBCUTANEOUS-RAT LD50; 2700 MG/KG SUBCUTANEOUS-MOUSE LD50.  
MONOHYDRATE: 375 MG/KG INTRAPERITONEAL-RAT LD50.  
CARCINOGEN STATUS: NONE.  
LOCAL EFFECTS: CORROSIVE- EYE; IRRITANT- INHALATION, SKIN.  
ACUTE TOXICITY LEVEL: SLIGHTLY TOXIC BY INGESTION (ANHYDROUS).  
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH RENAL IMPAIRMENT, ADDISON'S  
DISEASE, DEHYDRATION, OR HYPERKALEMIA.

## HEALTH EFFECTS AND FIRST AID

INHALATION:  
CITRIC ACID:  
IRRITANT.  
ACUTE EXPOSURE- INHALATION MAY CAUSE MUCOUS MEMBRANE IRRITATION WITH SORE  
THROAT, COUGHING AND SHORTNESS OF BREATH. ALLERGIC REACTIONS MAY OCCUR  
IN SOME INDIVIDUALS.  
CHRONIC EXPOSURE- LONG-TERM OVEREXPOSURE MAY DAMAGE TOOTH ENAMEL.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING  
HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST.  
TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:  
CITRIC ACID:  
IRRITANT.  
ACUTE EXPOSURE- CONTACT MAY CAUSE MODERATE IRRITATION WITH REDNESS AND  
PAIN. ALLERGIC REACTIONS MAY OCCUR IN SOME INDIVIDUALS.  
CHRONIC EXPOSURE- REPEATED OR PROLONGED CONTACT WITH IRRITANTS 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 (APPROXIMATELY 15-20 MINUTES). GET MEDICAL  
ATTENTION IMMEDIATELY.

EYE CONTACT:  
CITRIC ACID:  
CORROSIVE.  
ACUTE EXPOSURE- CONTACT MAY CAUSE SEVERE IRRITATION WITH REDNESS, PAIN  
AND POSSIBLY BURNS. A LARGE QUANTITY OF SATURATED SOLUTION SPLASHED  
IN HUMAN EYES PRODUCED A SEVERE CONJUNCTIVAL REACTION AND ULCERATION  
OF THE CORNEA, RESULTING IN EXTENSIVE ADHERENT LEUKOMA. IRRIGATION  
WITH A 0.5% SOLUTION FOR 30 MINUTES CAUSED PERMANENT CLOUDINESS OF  
THE CORNEA IN RABBIT EYES; A 2% SOLUTION CAUSED SEVERE DENSE  
OPACIFICATION.  
CHRONIC EXPOSURE- EFFECTS ARE DEPENDENT UPON CONCENTRATION AND DURATION  
OF EXPOSURE. CONJUNCTIVITIS OR EFFECTS SIMILAR TO THOSE AS FOR ACUTE  
EXPOSURE MAY OCCUR.

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:  
CITRIC ACID:  
ACUTE EXPOSURE- INGESTION OF LARGE AMOUNTS MAY CAUSE ACUTE BUT TRANSIENT  
GASTROINTESTINAL IRRITATION WITH VOMITING AND DIARRHEA. CONCENTRATED  
SOLUTIONS MAY CAUSE MILD CORROSION OF THE UPPER GASTROINTESTINAL  
TRACT WITH SORE THROAT, ABDOMINAL PAIN, WRINKLING AND ROUGHENING  
OF MUCOUS MEMBRANES OF THE MOUTH AND ESOPHAGUS, AND SWELLING AND  
DISCOLORATION OF THE STOMACH AND INTESTINE. A HUMAN DEATH HAS BEEN  
REPORTED FOLLOWING INGESTION OF 20-30 GRAMS OF THE PURE ACID. LETHAL  
DOSES IN RATS PRODUCED METABOLIC ACIDOSIS AND CALCIUM DEFICIENCY.  
CHRONIC EXPOSURE- FREQUENT OR EXCESSIVE INTAKE OF CITRIC ACID MAY CAUSE  
EROSION OF THE TEETH AND LOCAL IRRITATION. PROLONGED FEEDING STUDIES  
IN ANIMALS RESULTED ONLY IN A SLIGHT INCREASE IN DENTAL ATTRITION.

FIRST AID- TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION  
IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD LOWER THAN HIPS TO PREVENT  
ASPIRATION.

ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY: STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

INCOMPATIBILITIES: CITRIC ACID: BASES: INCOMPATIBLE. METAL NITRATES: POSSIBLE EXPLOSION HAZARD. OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

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 AWAY FROM INCOMPATIBLE SUBSTANCES. KEEP IN A TIGHTLY CLOSED CONTAINER. STORE IN A COOL, DRY, VENTILATED AREA.

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. AVOID CONTACT WITH STRONG OXIDIZERS, EXCESSIVE HEAT, SPARKS, OR OPEN FLAME.

SPILL AND LEAK PROCEDURES

OCCUPATIONAL SPILL: SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH SPILLED MATERIAL INTO SEWER. KEEP UNNECESSARY PEOPLE AWAY.

PROTECTIVE EQUIPMENT

VENTILATION: PROVIDE LOCAL EXHAUST VENTILATION. VENTILATION EQUIPMENT MUST BE EXPLOSION PROOF.

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 DUST AND MIST RESPIRATOR WITH A FULL FACEPIECE.

ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH-EFFICIENCY PARTICULATE FILTER.

ANY POWERED AIR-PURIFYING RESPIRATOR WITH A TIGHT-FITTING FACEPIECE AND HIGH-EFFICIENCY PARTICULATE FILTER.

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 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.

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.

AUTHORIZED - FISHER SCIENTIFIC, INC. CREATION DATE: 08/15/90 REVISION DATE: 03/24/93

-ADDITIONAL INFORMATION-

THIS INFORMATION IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, WE MAKE NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES.