

MATERIAL SAFETY DATA SHEET

MSDS 7710

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***** 24 HOUR EMERGENCY CONTACT: CHEMTREC (800) 424-9300 *****
 ***** 24 HOUR EMERGENCY CONTACT: COMPANY (803) 481-8528 *****

DATE: 3/31/04 SUPERSEDES: 10/15/00
 TRADE NAME: FERRIC CHLORIDE ETCHANTS (ALL GRADES) <7065>

1 PRODUCT IDENTIFICATION

NA = NOT APPLICABLE, ND = NOT DETERMINED

| ***** N.F.P.A. ***** | | |
|----------------------|-------------------------|-------|
| DEGREE OF HAZARD | EMERGENCY HAZARD RATING | |
| 4 = EXTREME | HEALTH | < 3 > |
| 3 = HIGH | FIRE | < 0 > |
| 2 = MODERATE | REACTIVITY | < 0 > |
| 1 = SLIGHT | SPECIFIC HAZARD | < > |
| 0 = INSIGNIFICANT | | |

TRADE NAME: FERRIC CHLORIDE ETCHANTS (ALL GRADES)
 FORMULA: MIXTURE
 MOLECULAR WT.: NOT APPLICABLE TO MIXTURES
 SYNONYMS: IRON(III) CHLORIDE SOLUTION; FERRIC TRICHLORIDE
 FERRIC CHLORIDE 42, 45, 48 DEG BAUME ETCHANTS;
 FERRIC CHLORIDE 35.10 ETCHANT; FERRIC CHLORIDE
 CHEMICAL MILLING

2 INGREDIENTS

| INGREDIENTS (CAS NO.) | WT PCT (APPROX) | PEL | | TLV(TWA) | |
|--------------------------------------|--------------------|-------|-----|----------|-----|
| | | MG/M3 | PPM | MG/M3 | PPM |
| FERRIC (III) CHLORIDE (7705-08-0) | 30-50 | | | 1(FE) | |
| HYDROCHLORIC ACID (7647-01-0) | 0-1 | 7* | 5* | 7* | 5* |

* = CEILING LIMIT; 15 MINUTE DURATION
 THE TLV'S ARE GIVEN FOR GUIDANCE; LOCAL APPLICABLE REGULATIONS SHOULD
 ALWAYS BE FOLLOWED. INGREDIENTS ARE THOSE PRESENT AT 1% OR GREATER,
 OR AT 0.1% OR GREATER IF LISTED AS POTENTIAL CARCINOGENS BY
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OSHA/IARC/NTP. PROPRIETARY INGREDIENT IDENTITIES ARE AVAILABLE IN
 ACCORDANCE WITH 29 CFR 1910.1200.
 CARCINOGEN: NTP - NO
 IARC - NO
 OSHA - NO

3 PHYSICAL AND CHEMICAL CHARACTERISTICS

D = DECOMPOSES
 BOILING POINT, 760 MM HG (DEG C): 332 (ANHYDROUS SALT)
 MELTING/FREEZING POINT (DEG C): -1 C

SPECIFIC GRAVITY (WATER = 1): 1.30 - 1.50 (SOLUTION)
VAPOR PRESSURE (MM HG): SLIGHTLY LESS THAN WATER
VAPOR DENSITY (AIR = 1): 1.11
WATER SOLUBILITY (% BY WT): MISCIBLE
VOLATILES (% BY WT): 50-70
EVAPORATION RATE (BUTYL ACETATE = 1): ND
PH OF SOLUTION: 2
APPEARANCE/ODOR: YELLOW-BROWN LIQUID; POSSIBLE SLIGHT ODOR OF HCL.

4 PHYSICAL HAZARD DATA

FERRIC CHLORIDE IS NOT CONSIDERED TO BE A FIRE HAZARD.
FLASH POINT (DEG C): NA
TEST METHOD: NA
FLAMMABLE LIMITS (% BY VOL): NA
AUTOIGNITION TEMP. (DEG C): NA
EXTINGUISHING MEDIA: ANY SUITABLE MEANS TO EXTINGUISH SURROUNDING
FIRE.
SPECIAL FIRE FIGHTING PROCEDURES: USE SPECIAL BREATHING EQUIPMENT
AND PROTECTIVE CLOTHING APPROPRIATE TO THE SURROUNDING FIRE.
UNUSUAL FIRE OR EXPLOSION HAZARDS: NOT CONSIDERED TO BE AN EXPLOSION
HAZARD.

5 REACTIVITY DATA

THERMAL STABILITY: STABLE UNDER ORDINARY CONDITIONS OF USE AND
STORAGE. SOLUTIONS ARE ACIDIC.
INCOMPATIBILITY: CORROSIVE TO METALS. MAY EXOTHERM WITH STRONG
BASES AND OXIDIZERS.
CONDITIONS TO AVOID: NOT DETERMINED.
HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.
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HAZARDOUS DECOMPOSITION PRODUCTS: WHEN HEATED TO DECOMPOSITION, EMITS
TOXIC HYDROGEN CHLORIDE OR CHLORINE.

6 HEALTH HAZARD INFORMATION

EFFECTS OF OVEREXPOSURE:
SYMPTOMS OF INGESTION: MAY CAUSE ABDOMINAL PAIN. PROLONGED
VOMITING MAY BEGIN UP TO ONE HOUR AFTER INGESTION OF EXCESSIVE
QUANTITIES OF SOLUBLE IRON SALTS. HEMATEMESIS, DEHYDRATION,
SHOCK, PALLOR, CYANOSIS, HYPOTHERMIA, VASOMOTOR INSTABILITY,
AND COMA MAY FOLLOW. IF DEATH IS NOT IMMEDIATE, IT MAY OCCUR
1-3 DAYS LATER. SURVIVORS MAY DEVELOP REVERSIBLE HEMORRHAGIC
HEPATIC NECROSIS. GASTRIC SCARRING MAY OCCUR AFTER 4 WEEKS.
PYLORIC STENOSIS AND MILD HEPATIC CIRRHOSIS MAY PERSIST.
SYMPTOMS OF INHALATION: MAY CAUSE IRRITATION OF THE UPPER
RESPIRATORY TRACT.
SYMPTOMS OF SKIN CONTACT: MAY CAUSE IRRITATION.
SYMPTOMS OF EYE CONTACT: MAY CAUSE IRRITATION. REPEATED OR
PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS.
CHRONIC EXPOSURE: PROLONGED OR REPEATED SKIN EXPOSURE MAY CAUSE
DERMATITIS.
TOXICITY DATA: (COMPONENTS AS ANHYDROUS)
ORAL TOXICITY: LDLO: 900 MG/KG (RAT) AS (7705-08-0)
LD50: 900 MG/KG (RABBIT) AS (7647-01-0)
INTERPERITONEAL TOXICITY: LD50: 260 MG/KG (MOUSE) AS (7705-08-0)
LD50: 40 MG/KG (MOUSE) AS (7647-01-0)

INTRAVENOUS TOXICITY: LDLO: 7 MG/KG (RABBIT) AS (7705-08-0)

7 EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT: IMMEDIATELY, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS APART. WASHING WITHIN ONE MINUTE IS ESSENTIAL TO ACHIEVE MAXIMUM EFFECTIVENESS. GET IMMEDIATE MEDICAL ATTENTION AFTER FLUSHING.

SKIN CONTACT: WASH AFFECTED AREA THOROUGHLY WITH WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDRY BEFORE REUSE. IF IRRITATION SHOULD DEVELOP, GET MEDICAL ATTENTION.

INHALATION: REMOVE TO FRESH AIR. KEEP WARM AND QUIET. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. CONSULT A PHYSICIAN.

INGESTION: NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. DO NOT INDUCE VOMITING. GIVE TWO GLASSES OF WATER OR MILK IF AVAILABLE. SEEK IMMEDIATE MEDICAL ATTENTION.

NOTES TO PHYSICIAN: TAKE APPROPRIATE ACTION TO COUNTERACT SYMPTOMS.

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8 INDUSTRIAL HYGIENE AND OCCUPATIONAL CONTROL PROCEDURES

VENTILATION: A SYSTEM OF LOCAL EXHAUST IS RECOMMENDED TO KEEP EMPLOYEE EXPOSURE BELOW THE AIRBORNE EXPOSURE LIMITS. LOCAL EXHAUST IS USUALLY PREFERRED BECAUSE IT CONTROLS THE EMISSION AT ITS SOURCE, PREVENTING DISPERSION OF IT INTO THE GENERAL WORK AREA. REFER TO THE ACGIH DOCUMENT "INDUSTRIAL VENTILATION, A MANUAL OF RECOMMENDED PRACTICES" FOR DETAILS.

RESPIRATORY PROTECTION: NIOSH/MSHA APPROVED RESPIRATOR IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS. GENERALLY, A DUST/MIST RESPIRATOR MAY BE WORN IN AREAS WHERE THE TLV IS EXCEEDED UP TO TEN TIMES. ALTERNATIVELY, A SUPPLIED AIR FULL FACEPIECE RESPIRATOR OR AIRLINED HOOD MAY BE WORN.

EYE PROTECTION: CHEMICAL SPLASH GOGGLES AND FACE SHIELD. AN EYE WASH FOUNTAIN AND QUICK-DRENCH FACILITIES SHOULD BE MAINTAINED IN THE WORK AREA.

SKIN PROTECTION: USE RUBBER OR PLASTIC IMPERVIOUS GLOVES AND BODY-COVERING CLOTHING.

PERSONAL HYGIENE: WASH THOROUGHLY AFTER HANDLING.

9 SAFE HANDLING, STORAGE AND USE PRECAUTIONS

PRECAUTIONARY MEASURES: AVOID CONTACT WITH SKIN, EYES, AND CLOTHING. WEAR PROTECTIVE CLOTHING, GLOVES, AND SPLASH GOGGLES AND SHIELD. WASH THOROUGHLY AFTER USING. AVOID BREATHING DUST OR MIST. USE WITH ADEQUATE VENTILATION.

STORAGE AND HANDLING: STORE IN A COOL, DRY, WELL VENTILATED AREA. ISOLATE FROM INCOMPATIBLE MATERIALS. PROTECT FROM PHYSICAL DAMAGE.

10 REGULATORY INFORMATION AND DISPOSAL PROCEDURES

SPILL/LEAK CLEAN-UP PROCEDURES: VENTILATE AREA OF SPILL. VACUUM UP SPILLED MATERIAL. PACKAGE FOR RECLAMATION OR RECOVERY. MATERIAL THAT CANNOT BE VACUUMED UP AND RECLAIMED SHOULD BE DIKED AND COVERED WITH SODIUM BICARBONATE OR SODA ASH. THE NEUTRALIZED WASTE SHOULD BE PACKAGED IN A CLOSED CONTAINER.

DISPOSAL METHOD: DISPOSE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL AND REGULATORY

REQUIREMENTS.

TOXIC SUBSTANCES CONTROL ACT(TSCA): CHEMICAL INGREDIENTS ARE
ON THE TSCA INVENTORY.

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SUPERFUND REPORTABLE QUANTITY(RQ): 1000# (7705-08-0)
5000# (7647-01-0)

HAZARDOUS WASTE NO.: D002 (UNLISTED HAZARDOUS WASTES CHARACTERISTIC
OF CORROSIVITY; RQ = 100 LBS.)

SARA TITLE III: HYDROCHLORIC ACID IS SUBJECT TO REPORTING.
(SECTION 313)

CANADIAN LISTS:

DSL/NDSL: INGREDIENTS ARE ON THE DOMESTIC SUBSTANCES LIST.

WHMIS: HYDROGEN CHLORIDE IS ITEM NUMBER 845 FROM THE
INGREDIENT DISCLOSURE LIST AND IS SUBJECT TO REPORTING AT 1%
THRESHOLD.

STATE LISTS: THIS MATERIAL CONTAINS INGREDIENTS THAT MAY BE LISTED FOR
REPORTING OR DISCLOSURE IN THE STATES OF CALIFORNIA, CONNECTICUT,
ILLINOIS, INDIANA, KENTUCKY, LOUISIANA, MASSACHUSETTS, MINNESOTA,
NEW JERSEY, NEW YORK, NORTH CAROLINA, OREGON, PENNSYLVANIA, OR
RHODE ISLAND. PLEASE CHECK WITH THE APPROPRIATE STATE AGENCIES.

FOR STATES NOT LISTED: PLEASE CHECK WITH THE APPROPRIATE AGENCIES.

WARNING: THIS PRODUCT MAY CONTAIN A CHEMICAL KNOWN TO THE STATE OF
CALIFORNIA TO CAUSE CANCER, OR BIRTH DEFECTS, AND/OR OTHER
REPRODUCTIVE HARM.

11 TRANSPORTATION DATA

DOT SHIPPING NAME: FERRIC CHLORIDE SOLUTION *
DOT HAZARD CLASS: 8
HAZARDOUS INGREDIENTS: FERRIC CHLORIDE
IDENTIFICATION NUMBER: UN 2582
PACKING GROUP: III
LABEL: CORROSIVE

* = FOR CONTAINER EXCEEDING 239.832 GALLONS, RQ IS REQUIRED.

NOTE: DURING AN INCIDENT INVOLVING THIS MATERIAL, USE OF DOT
EMERGENCY RESPONSE GUIDE NO. 154 IS ALSO RECOMMENDED.

12 ADDITIONAL WARNINGS AND INFORMATION

IT IS REASONABLE TO ASSUME THAT FERRIC ETCHANT COMPOUNDS CONTAIN
ARSENIC, CADMIUM, CHROMIUM, AND LEAD IN CONCENTRATIONS RANGING FROM A
FEW PARTS PER BILLION TO SEVERAL HUNDRED PARTS PER MILLION.

ALL INFORMATION PRESENTED HEREIN IS GIVEN IN GOOD FAITH AND IS BASED
ON SOURCES AND TESTS CONSIDERED TO BE RELIABLE, BUT CANNOT BE
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GUARANTEED. IT IS THE USER'S FULL RESPONSIBILITY TO ACCEPT RISK FOR
THE SAFETY, TOXICITY, HANDLING, STORAGE, AND USE OF THE PRODUCT, AS
WELL AS TO DETERMINE THE SUITABILITY OF THE PRODUCT FOR A SPECIFIC
PURPOSE. WE MAKE NO WARRANTY AS TO THE RESULTS TO BE OBTAINED IN
USING THE PRODUCT; THEREFORE ALL RISKS MUST BE ASSUMED BY THE USER.