MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

MANUFACTURER: TRANSENE COMPANY, INC.
ADDRESS: DANVERS INDUSTRIAL PARK
10 ELECTRONICS AVENUE DANVERS, MA 01923,
TEL: (978) 777-7860 FAX: (978)-739-5640
WWW.TRANSENE.COM
EMERGENCY NO. 1-800-424-9300 CHEMTREC

MATERIAL NAME: COPPER ETCHANT 49-1
REVISED: December 2009
CHEMICAL FAMILY: Citric Acid Solution

SECTION 2. HEALTH HAZARD INFORMATION

GHS Classifications
Oxidizing liquids : Not classified
Corrosive to Metals: Not classified
Acute toxicity Oral : Category 5
Acute Toxicity Dermal: Not classified
Acute toxicity Inhalation : Category 5
Skin corrosion / Skin irritation : Category 3
Serious eye damage / Eye irritation : Category 2A
Respiratory or skin sensitization : Not classified
Special target organ systemic toxicity single exposure: Not classified
Special target organ systemic toxicity repeated exposure : Not classified
Acute aquatic environmental hazards : Not classified
Chronic aquatic environmental hazards: Not classified

Pictograms or Hazard symbols

Warning: Causes eye irritation.
Warning: Causes mild skin irritation. May be harmful if swallowed, inhaled, or in contact with skin.

Precautionary Statement Prevention
Use only in a well-ventilated area. Do not eat, drink or smoke when using this product. Do not breathe fume/gas/mist/vapors/spray.
Wear protective gloves/protective clothing /eye protection/face protection.
Wash hands thoroughly after handling.
Avoid release to the environment

SECTION 3.COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Material</th>
<th>Wt %</th>
<th>Toxicity</th>
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<tbody>
<tr>
<td>Citric Acid</td>
<td>&lt; 2</td>
<td></td>
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<tr>
<td>REV 2 Copper Etchant 49-1</td>
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SECTION 4. FIRST AID MEASURES

EFFECTS OF OVEREXPOSURE
FIRST AID:
Overexposure to mist can cause tissue damage, especially to eyes and lungs.

SECTION 5. FIRE FIGHTING MEASURES

Flash Point and Method Autoignition Temp. Flammability Limits In Air
non-flammable NA LOWER

Extinguishing media: Water spray or fog, carbon dioxide and dry chemical.
Special fire fighting procedures: None

SECTION 6. ACCIDENTAL RELEASE MEASURES

SPILLS, LEAKS: Ventilate area of leak or spill. Dike and cover the contaminated areas with absorbent, non-combustible material such as earth, sand, or vermiculite.

SECTION 7. HANDLING AND STORAGE

Wash thoroughly after handling. Remove contaminated clothing and wash before re-use. Do not breathe mist or vapor. Do not expose eyes, skin, or clothing. Keep container closed tightly. Use with adequate ventilation or respiratory protection. Do not store near combustibles or in direct sunlight. Store in a cool, dry, well-ventilated area away from incompatible substances. Separate from strong acids.

SECTION 8. EXPOSURE CONTROL/PERSONAL PROTECTION

Respiratory protection: None required.
Ventilation: Where adequate ventilation is not available, use NIOSH approved vapor respirator with dust, fume and mist filters. Local ventilation through fume hoods or laminar flow stations is also preferred. Keep fumes away from strong bases.
Protective gloves: Skin contact should be minimized through use of rubber gloves.
Other protective equipment: Steel tipped shoes/eye wash station/chemical safety chemical retardant clothing.
Eye protection: Safety goggles / face shield

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Form: Liquid
Appearance: Colorless
Odor: Mild ammonia
pH: 5.9-6.5
Melting point: 0 °C
Boiling point/Boiling range: 100 °C (water)
Flash point: Non-flammable.
Ignition point: Will not ignite.
DANGER OF EXPLOSION:
Product is not explosive

VAPOR DENSITY (Air = 1):
Not available

VOLATILES, %:
> 80

VAPOR PRESSURE AT 15°C, MM Hg:
Not available

SPECIFIC GRAVITY:
1.01 g/cc

SOLUBILITY IN / MISCELLIBILITY:
Completely miscible in water

EVAP. RATE (Water = 1):
> 1

SECTION 10. STABILITY AND REACTIVITY

Stability
Stable X
Conditions to avoid: Excess heat, light, confined spaces

Unstable

Incompatible with:
Strong acids; oxidizers

Hazardous decomposition products: Carbon and carbon oxides; ammonia

Hazardous May occur
Conditions to avoid: Excess heat, damp.

polymerization: Will not occur X

SECTION 11. TOXICOLOGICAL INFORMATION

ACUTE, Citric Acid:
LD₅₀ (oral, rat): 6,730 mg/kg
LD₅₀ (eye, rabbit): 750 mg/24 hr

SECTION 12. ECOLOGICAL INFORMATION

Bioaccumulation: There is no evidence of bioaccumulation.

Ecotoxicity: Biologic effects:
No data for this product.

SECTION 13. DISPOSAL CONSIDERATIONS

DISPOSAL: Dispose of in accordance with all federal state and local regulations. Send waste to an approved waste disposal facility.

SECTION 14. TRANSPORTATION INFORMATION

Non-hazardous/non-regulated.

SECTION 15. REGULATORY

Symbol: C, Corrosive
R-Phrase:
R21/22: Harmful in contact with skin and if swallowed.
S-Phrases:
S17: Keep away from combustible material.
NFPA Codes:
Health: 1
Flammability: 0
Reactivity: 0
All ingredients of this product are listed on the US TSCA inventory under their parent anhydrous compounds.