MATERIAL SAFETY DATA SHEET

HydroChem
INDUSTRIAL SERVICES, INC.

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: Liquid Citric Acid, 50%
Product Code: L051
Product Name: Liquid Citric Acid, 50%
Chemical Family: Organic acid, Chelant
Molecular Formula: HOC(COOH)(CH₂COOH)₂

MANUFACTURER:
HydroChem Industrial Services, Inc.
900 Georgia Ave.
Deer Park, TX 77536
Customer Service: (800) 934-9376

24 HR. EMERGENCY TELEPHONE NUMBERS:
Emergency Contact: HydroChem ER
Emergency Phone: (800) 569-4889

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>wt.%</th>
<th>CAS Registry #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric Acid, Anhydrous</td>
<td>50</td>
<td>77-92-9</td>
</tr>
<tr>
<td>Water</td>
<td>50</td>
<td>7732-18-5</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
IMMEDIATE CONCERNS:
Acid.
Corrosive.
Do not get in eyes, on skin or clothing.

4. FIRST AID MEASURES

EYES:
Immediately flush eyes with water for 30 minutes while holding eyelids open. Seek medical attention.

SKIN:
Immediately wash with soap and water for 30 minutes. See a doctor at once. Launder contaminated clothing before reuse. Dispose of contaminated shoes.

INGESTION:
If swallowed, give 2 glasses of milk (preferred) or water and consult physician.
INHALATION:
Remove to fresh air. See a doctor if effects occur.

5. FIRE FIGHTING MEASURES

Flashpoint and Method: >200°F 93°C
Flammable Limits: Not determined
Autoignition Temperature: Not established

EXTINGUISHING MEDIA:
Use alcohol foam, carbon dioxide, dry chemical or water spray when fighting fires involving this material.

HAZARDOUS COMBUSTION PRODUCTS:
Oxides of carbon and harmful organic chemical fumes.

FIRE FIGHTING PROCEDURES:
Use water fog to cool hot containers.

FIRE FIGHTING EQUIPMENT:
As in any fire, wear self-contained breathing apparatus pressure-demand, (MSHA/NIOSH approved or equivalent) and full protective clothing to prevent contact with skin and eyes.

6. ACCIDENTAL RELEASE MEASURES

GENERAL PROCEDURES:
Contain with dikes.
Dilute with water.
Neutralize with soda ash or lime.
Put in steel drum (plastic drum if acidic).

7. HANDLING AND STORAGE

GENERAL PROCEDURES:
Refer to Section 8.

STORAGE:
No special precautions required.
Store away from oxidizers.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

PERSONAL PROTECTION
EYES AND FACE:
Chemical goggles required and an eye wash in work area.

RESPIRATORY:
None normally needed. For protection from dust and mist, use NIOSH approved respirator with dust and mist protection.

PROTECTIVE CLOTHING:
Clean body covering and chemical resistant gloves.

OTHER USE PRECAUTIONS:
Safety shower and eye wash in the work area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid
Color: Colorless
pH: 0.6
Percent Volatile: 50
Vapor Pressure: 11.16 mm Hg
Boiling Point: 219°F 103°C
Solubility in Water: Completely Miscible in All Proportions
Evaporation Rate: <1 (n-Butyl Acetate=1)
Specific Gravity: 1.24 (water=1)

10. STABILITY AND REACTIVITY

STABLE: Yes

HAZARDOUS POLYMERIZATION: No

HAZARDOUS DECOMPOSITION:
When heated strongly or burned, oxides of carbon and harmful organic chemical fumes are released.

INCOMPATIBLE MATERIALS:
Oxidizers, bases. Can be explosive with metal nitrates.
11. TOXICOLOGICAL INFORMATION

ACUTE
Eyes: Severe irritant. Causes pain and redness. Prolonged or repeated contact may cause mild burn.
Skin: Irritant. May cause pain, redness, dermatitis. Not likely to be absorbed in toxic amounts.
Ingestion: No effect expected. Swallowing large amounts may cause illness.
Inhalation: No effect expected. Prolonged or repeated exposure may cause mild irritation. Mist is irritating.

TARGET ORGANS:
Skin

GENERAL COMMENTS:
Carcinogens: Not listed by IARC, USA NTP, or USA OSHA.

COMMENTS:
Only selected Registry of Toxic Effects of Chemical Substances (RTECS) data is presented in this document. See the actual entry in RTECS for complete information.
RTECS Number: GE7350000
LC(50) = 11.7 g/kg on rats (for anhydrous citric acid)

12. ECOLOGICAL INFORMATION

GENERAL COMMENTS:
Degradability: Biodegradable.
Fish Toxicity: Low toxicity to fish.

COMMENTS:
BOD = 0.24 p/p; COD = 0.35 p/p (68% degradation in 5 days)
LC50 (P. promelas) = 200 mg/L

13. DISPOSAL CONSIDERATIONS

PRODUCT DISPOSAL:
Dispose of in accordance with ALL applicable federal, state and local regulations.

EMPTY CONTAINER:
Leave label on drum and sell drum to an approved drum reconditioner or triple rinse with an appropriate solvent, crush, and ship to sanitary landfill unless prohibited by local regulations.
14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)
Proper Shipping Name: Citric Acid Solution, 50% - Nonregulated
Reportable Quantity (RQ) Under CERCLA: None
Placards: None

15. REGULATORY INFORMATION

UNITED STATES
SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)
Fire: No Pressure Generating: No Reactivity: No Acute: Yes Chronic: No
Title III Notes: This product contains no substances which are defined as toxic chemicals under the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (40 CFR Part 372).

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION, AND LIABILITY ACT)
Reportable Spill Quantity: None

TSCA (TOXIC SUBSTANCE CONTROL ACT)
TSCA Status: All components of this material are on the TSCA inventory.

STATE REGULATIONS
PROPOSITION 65 STATEMENT:
This product does not contain any substance(s) which are defined by the state of California to cause cancer, birth defects, or other reproductive effects.

16. OTHER INFORMATION

REASON FOR ISSUE:
Biannual review

Approved by: Charles M Maddin, PhD, FAIC
Approval date: 01/16/2001
REVISION SUMMARY
Revision #: 3

This MSDS replaces the November 22, 1999 MSDS. Any changes in information are as follows:
In Section 1
   Date Prepared
   In Section 15
   SARA Title III Notes

NFPA CODES
   Fire: 1    Health: 1    Reactivity: 0

HMIS CODES
   Fire: 1    Health: 1    Reactivity: 0

MANUFACTURER DISCLAIMER:
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The information herein is believed to be accurate and is presented in good faith; however, no warranties or representations are made by HydroChem Industrial Services, Inc. regarding the accuracy or completeness of the information.

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