Citric Acid Anhydrous  
Material Safety Data Sheet

<table>
<thead>
<tr>
<th>Transport Symbol</th>
<th>WHMIS</th>
<th>NFPA</th>
<th>Personal Protective Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not controlled</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Original Preparation Date: 15-Apr-2009  
Revision Date: 12-Nov-2012  
Revision Number: 1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product Name:  
Citric Acid Anhydrous

Synonyms:  
2-hydroxy-1,2,3-propanetricarboxylic acid, or  
2-hydroxypropane-1,2,3-tricarboxylic acid.

Product Code:  
C001, 020410, 020420, 020440

Use of the Substance / Preparation:  
Chemical intermediate. Personal care products.  
Cleaning/detergent products and other household products.  

Contact Supplier:  
Chemical Store Inc.  
1059 Main Avenue  
Clifton, NJ 07011, USA  
Telephone Number: (+1) 973-405-6248

Emergency response telephone number:  
Chemtrec 1-800-424-9300 (CCN 1635)

2. HAZARDS IDENTIFICATION

Emergency Overview

Warning. Irritating to eyes. Corrosive to metals (as aqueous solution). Product dust may cause mild, mechanical irritation. May form combustible dust concentrations in air.

Appearance  
White

Physical State  
Solid: Powder / Granular

Odor  
Odorless

Classification according to 29 CFR 1910, amended to conform to the United Nations' Globally Harmonized System of Classification and Labelling of Chemicals (GHS):

| Serious Eye Damage / Eye Irritation | Category 2  
| Hazards Not Otherwise Classified     | Combustible Dust |

GHS Label Elements

Signal Word:  
Warning

GHS Hazard Pictogram(s):  
![Hazard Pictogram]

Hazard Statement(s):  
H319 Causes serious eye irritation  
May form combustible dust concentrations in air.

Precautionary Statement(s):  
Prevention Precautionary Statement(s):  
Wash hands and exposed skin thoroughly after handling. Wear eye protection.  
Response Precautionary Statement(s):  
If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>North American Hazard Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>77-92-9</td>
<td>99-100</td>
<td>OSHA / GHS: Eye Irrit. 2; WHMIS: E</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Description of first aid measures

General Advice  If symptoms persist, call a physician. Show this safety data sheet to the doctor in attendance. Use personal protective equipment. For personal protection see section 8.

Eye Contact  Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. If symptoms persist, call a physician.

Skin Contact  Wash off immediately with soap and plenty of water removing all contaminated clothes and shoes.

Inhalation  Move to fresh air.

Ingestion  Clean mouth with water and afterwards drink plenty of water.

Protection of First-aiders  Use personal protective equipment. Avoid contact with skin, eyes and clothing.

Most important symptoms and affects, both acute and delayed

Eyes  Irritating to eyes. Contact with eyes may cause mechanical irritation.

Skin  According to GHS hazard classification criteria, the product is not considered as being a skin irritant. Product dust may cause mild, mechanical irritation. Health injuries are not known or expected under normal use.

Inhalation  May cause irritation of respiratory tract. Based on the low pH, citric acid would be expected to cause irritation to the respiratory tract, resulting in a higher cough response as the inhalation exposure concentration was increased.

Ingestion  Oral exposure is not anticipated under normal working conditions. Health injuries are not known or expected under normal use.

Main Symptoms  Itching. Redness. Burning sensation.

Indication of any immediate medical attention and special treatment needed

Notes to Physician  Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Flammable Properties
Fine dust dispersed in air may ignite. Risk of ignition followed by flame propagation or secondary explosions should be prevented by avoiding accumulation of dust, e.g. on floors and ledges.

Extinguishing media

Suitable Extinguishing Media  Dry chemical. Carbon dioxide (CO₂) Water spray. Foam. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media  No information available.

Special hazards arising from the substance or mixture

Hazardous Combustion Products  Thermal decomposition can lead to release of irritating gases and vapors, Carbon monoxide (CO), Carbon dioxide (CO₂).

Specific Hazards Arising from the Chemical

Sensitivity to mechanical impact  None known.

Sensitivity to static discharge  No.

Further information  Yes. (as dust).
Fine dust dispersed in air may ignite. Dust explosibility class = 1. Weak to moderately explosive.
Advice for fire-fighters

Protective Equipment and Precautions for Firefighters  As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Stability and Reactivity</th>
<th>Physical hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>None known</td>
</tr>
</tbody>
</table>

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Avoid contact with the skin and the eyes. Use personal protective equipment. For personal protection see section 8. Avoid dust formation.

Environmental Precautions
Prevent further leakage or spillage if safe to do so. Prevent product from entering drains.

Methods for Clean-up
Pick up and transfer to properly labelled containers. Avoid dust formation. Keep in suitable, closed containers for disposal. Aqueous spillage should be neutralized and treated prior to discharge. For disposal information see section 13.

7. HANDLING AND STORAGE

Handling
Wear personal protective equipment. Avoid contact with skin, eyes and clothing. Handle in accordance with good industrial hygiene and safety practice. Do not breathe vapours/dust. Use only in area provided with appropriate exhaust ventilation. Avoid dust formation in confined areas. Fine dust dispersed in air may ignite. Ensure adequate ventilation. Refer to NFPA 61, "Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities".

Storage

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limits
As an airborne dust, exposure limits pertaining to "particulates not otherwise regulated" have been provided below. Specific exposure limits have not been identified for this product. However, as an irritant, it is advisable to limit worker exposure to the greatest extent possible.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>MEXICO</th>
<th>NIOSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particulates not otherwise regulated</td>
<td>TWA: 10 mg/m³ inhalable particles, recommended TWA: 3 mg/m³ respirable particles, recommended</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction</td>
<td>not listed</td>
<td>not listed</td>
</tr>
</tbody>
</table>

Engineering Measures
Local exhaust ventilation. Ensure adequate ventilation, especially in confined areas.

General Hygiene Considerations
When using, do not eat, drink or smoke. Regular cleaning of equipment, work area and clothing.

Personal Protective Equipment

Eye/face Protection.
Safety glasses with side-shields. If airborne dust concentrations are excessive, wear goggles.

Skin and Body Protection
Impervious gloves. Long sleeved clothing. Boots.

Respiratory Protection
Respirator with a dust filter. In case of insufficient ventilation wear suitable respiratory equipment.
9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance  White
Physical State  Solid: Powder / Granular
Odor  Odorless
Odor Threshold  Not applicable
pH  1.8 @ 25°C at 5wt% conc
Dissociation Constants (pKa)  3.13, 4.76, and 6.4 at 25°C

Flash Point  Not applicable (solid)
Autoignition Temperature  Not applicable (No obligation to report where the autoignition temperature is >400°C.)
Boiling point  Not applicable (decomposes before boiling)
Melting/Freezing Point  153.000 °C / 307.000 °F (101.3 kPa)
Decomposition temperature  No information available
Oxidizing Properties  Not oxidizing
Flammability Limits in Air  Not flammable
Explosion Limits  Not explosive

Solubility(ies)
Water Solubility  590g/l at 20°C
Surface Tension  Not applicable. (no surface tension anticipated).
Evaporation Rate  Not applicable (solid)
Vapor Pressure  2.21E-6 Pa at 25°C Not applicable
Vapor Density  Not applicable
Density  1.665g/m³ at 20°C
Relative Density  1.665g/m³ at 20°C
Bulk Density  500-950kg/m³ at 20°C
Viscosity  Not applicable (solid)
Partition Coefficient (n-octanol/water)  -0.2 to -1.8

10. STABILITY AND REACTIVITY

Reactivity  Reactions with metal nitrates may be potentially explosive. Aqueous form is corrosive to copper, zinc, aluminum and their alloys.
Stability  Not applicable. Stable under normal conditions.
Possibility of Hazardous Reactions  None under normal processing.
Conditions to Avoid  Avoid dust formation. Heat, flames and sparks.
Hazardous Decomposition Products  Thermal decomposition can lead to release of irritating gases and vapors Carbon monoxide (CO) Carbon dioxide (CO₂)

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects

<table>
<thead>
<tr>
<th>Acute toxicity</th>
<th>Based on available data, the classification criteria are not met.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Name</td>
<td>Weight %</td>
</tr>
<tr>
<td>Citric acid</td>
<td>99-100</td>
</tr>
</tbody>
</table>

Skin corrosion/irritation  Based on available data, not, or only slightly irritating.
Serious eye damage/eye irritation  Irritant, causes serious eye irritation.

Method  OECD Guideline 405 (Acute Eye Irritation / Corrosion)
Species  Rabbit (New Zealand White)
020410, 020420, 020440 - Citric Acid Anhydrous

Revision Date: 12-Nov-2012

Results

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<table>
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<tbody>
<tr>
<td>Overall irritation score</td>
<td>for 10% solution: 9.3 of max. 110 (mean (of 3 animals)) (Time point: at 1, 24, 48 or 72 h) (fully reversible within: 7 days) (score achieved at 1 h) Overall irritation score for 30% solution: 16 of max. 110 (mean (of 3 animals)) (Time point: at 1, 24, 48 or 72 h) (not fully reversible within: 14 days) (fully reversible in 14-21 days) (expert opinion) (score achieved at 1 h)</td>
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Respiratory or skin sensitisation

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<tbody>
<tr>
<td>Based on available data, not expected to be a skin or respiratory sensitiser.</td>
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Germ cell mutagenicity

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<tbody>
<tr>
<td>Based on available data, negative to test/non-mutagenic.</td>
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</table>

Carcinogenicity

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<tbody>
<tr>
<td>Based on available data, no evidence of carcinogenicity.</td>
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</table>

Reproductive toxicity

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<tbody>
<tr>
<td>Based on available data, no evidence of reproductive toxicity.</td>
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</table>

STOT - single exposure

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>No evidence of toxicity.</td>
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</table>

STOT - repeated exposure

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<thead>
<tr>
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<tbody>
<tr>
<td>Based on available data, no toxicity identified at highest exposure levels [NOAEL(rats) 4000mg/kg bw/d].</td>
<td></td>
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</table>

Aspiration hazard

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<tbody>
<tr>
<td>Based on available data, no known aspiration hazard.</td>
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</table>

Potential health effects

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Eyes</td>
<td>Irritating to eyes. Contact with eyes may cause mechanical irritation.</td>
</tr>
<tr>
<td>Skin</td>
<td>According to GHS hazard classification criteria, the product is not considered as being a skin irritant. Product dust may cause mild, mechanical irritation. Health injuries are not known or expected under normal use.</td>
</tr>
<tr>
<td>Inhalation</td>
<td>May cause irritation of respiratory tract. Based on the low pH, citric acid would be expected to cause irritation to the respiratory tract, resulting in a higher cough response as the inhalation exposure concentration was increased.</td>
</tr>
<tr>
<td>Ingestion</td>
<td>Oral exposure is not anticipated under normal working conditions. Health injuries are not known or expected under normal use.</td>
</tr>
</tbody>
</table>

Main Symptoms

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Itching</td>
<td>Redness. Burning sensation.</td>
</tr>
</tbody>
</table>

12. ECOLOGICAL INFORMATION

Ecotoxicity

Not classified for aquatic toxicity. Contains no substances known to be hazardous to the environment. Contains no substances known to be not degradable in waste water treatment plants.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Fresh Water Algae</th>
<th>Acute Fish Toxicity</th>
<th>Daphnia (Water flea)</th>
<th>Effects on micro-organisms</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>NOEC(8d): 425mg/l (nominal)*</td>
<td>LC50:440mg/L (Leuciscus idus)</td>
<td>EC50: 1535mg/L (Daphnia magna)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Determined by extrapolation (testing of intrinsic toxicity to algae impractical due to nutrient complexing behaviour of citric acid)

Predicted No Effect Concentrations (PNEC) - Determined by extrapolation

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Aqua (fresh water)</th>
<th>Aqua (marine)</th>
<th>Sewage Treatment Plant</th>
<th>Sediment (fresh water)</th>
<th>Sediment (marine)</th>
<th>Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>0.44mg/l</td>
<td>0.044mg/l</td>
<td>&gt;1000mg/l</td>
<td>34.6mg/kg sediment dw</td>
<td>3.46mg/kg sediment dw</td>
<td>33.1mg/kg</td>
</tr>
</tbody>
</table>

Bioaccumulative Potential

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>log Kow</th>
<th>BCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>-0.2 to -1.8</td>
<td>BCF ~ 3.2 (estimated)</td>
</tr>
</tbody>
</table>

Persistence/Degradability

Readily biodegradable. Inherently biodegradable. 97% and 100% biodegradability in 28d and 19d, respectively (protocols OECD 301E and OECD 301A, respectively).

Mobility

Soluble in water.

PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).

13. DISPOSAL CONSIDERATIONS

Whenever possible, as rules and regulations allow, please recycle or manage materials to minimize waste.

Waste Disposal Methods

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Dispose of in compliance with the laws and regulations pertaining to this product in your jurisdiction. Rinsewater resulting from cleanup should be collected for treatment before disposal. Solutions with low pH-value should be neutralized before discharge.</td>
<td></td>
</tr>
</tbody>
</table>

Contaminated Packaging

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty containers should be decontaminated and taken for local recycling, recovery or waste disposal.</td>
<td></td>
</tr>
</tbody>
</table>
14. TRANSPORT INFORMATION

Domestic transport regulations (USA)
DOT Not regulated

Domestic transport regulations (Canada)
TDG Not regulated

Domestic transport regulations (Mexico)
MEX Not regulated

International transport regulations
ICAO Not regulated
IATA Not regulated
IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories
The components of this product are reported in the following inventories:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>AICS</th>
<th>ENCS ISHL</th>
<th>CHINA</th>
<th>PICCS</th>
<th>KECL</th>
<th>NZLoC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes (2)-1318</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes KE-20831</td>
<td>No</td>
</tr>
</tbody>
</table>

USA

Federal Regulations
Ozone Depleting Substances:
No Class I or Class II material is known to be used in the manufacture of, or contained in, this product.

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product is not known to contain any chemicals which are subject to the reporting requirements of the Act or regulations contained in 40 CFR 372.

SARA 302
Section 302 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product is not known to contain any chemicals which are subject to the reporting requirements of the Act or regulations contained in 40 CFR 302.

SARA 311/312 Hazardous Categorization
Acute Health Hazard Yes
Chronic Health Hazard No
Fire Hazard No
Sudden Release of Pressure Hazard No
Reactive Hazard No

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product is not known to contain any HAPs.

State Regulations
State Right-to-Know
No known components subject to "Right-To-Know" legislation in the following States: Massachusetts. Minnesota. New Jersey. Pennsylvania.

Canada

WHMIS Product Classification
Class E: Corrosive Material.

WHMIS Ingredient Disclosure List IDL
Component Information

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Weight %</th>
<th>WHMIS IDL</th>
<th>WHMIS Threshold limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citric acid</td>
<td>99-100</td>
<td>Listed</td>
<td>1%</td>
</tr>
</tbody>
</table>
(NPRI) Canadian National Pollutant Release Inventory
No known component is listed on NPRI.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the CPR.

Mexico
Mexico - Grade Moderate risk, Grade 2

16. OTHER INFORMATION

Prepared By: Chemical Store Inc using ADM Specialty Food, Corn
Revision Date: 12-Nov-2012
Revision Number: 1
Reason for revision: New SDS format. This version replaces all previous versions.

Abbreviations and acronyms
• AICS - Australian Inventory of Chemical Substances (Australia)
• CAS - Chemical Abstract Service
• CHINA - Chinese Inventory of Existing Chemical Substances (China)
• DNEL - Derived No Effect Level
• DOT - U.S. Department of Transportation
• DSL - Domestic Substance List (Canada)
• EC50 - Half maximal effective concentration
• EINECS - European Inventory of Existing Commercial Chemical Substances (EU)
• ELINCS - European List of Notified Chemical Substances (EU)
• ENCS - Existing and New Chemical Substances (Japan) / ISHL - Industrial Health and Safety Law (Japan)
• GHS - Globally Harmonized System of Classification and Labelling of Chemicals
• IATA - International Air Transport Association Dangerous Goods Regulations
• ICAO - International Civil Aviation Organisation
• IMDG - International Maritime Dangerous Goods Code
• IMO - International Maritime Organization
• KECL - Korean Existing and Evaluated Chemical Substances (Korea)
• LC50 - Lethal concentration that produces fatalities in 50% of a given test population
• LD50 - Median lethal dose of a given test population
• MEX - NOM-002-SCT/2003 List of Hazardous Substances and Materials Most Commonly Transported
• MEXICO - Mexico Occupational Exposure Limits
• NDSL - Non Domestic Substances List (Canada)
• NFPA - National Fire Protection Association
• NIOSH - National Institute of Occupational Safety and Health
• NZLoC - New Zealand Inventory of Chemicals (New Zealand)
• OECD - Organisation for Economic Co-operation and Development
• OSHA - Occupational Safety & Health Administration
• OSHA PEL - Occupational Safety and Health Administration Permissible Exposure Limits
• PICCS - Inventory of Chemicals and Chemical Substances (Philippines)
• PNEC - Predicted No-Effect Concentration
• STOT - Specific Target Organ Toxicity
• TSCA - Toxic Substances Control Act, Section 8(b) Inventory (USA)
• TWA - Time Weighted Average: Average concentration that should not be exceeded during a work day (usually 8-hours)
• vPvB - Very Persistent and Very Bioaccumulative
• WGK - Wassergefährdungsklasse (German: Water Hazard Class)
• WHMIS - Workplace Hazardous Materials Information System

The information provided on this (M)SDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of sheet