CITRIC ACID

SDS Number: C4730 --- *Effective Date: 12/08/96*

. Product Identification

Synonyms: 2-Hydroxy-1,2,3-propanetricarboxylic acid, monohydrate
CAS No.: 77-92-9
Molecular Weight: 210.14
Chemical Formula: H3C6H5O7.H2O
Product Codes: J.T. Baker: 0110, 0115, 0118, 0119, 0120 Mallinckrodt: 0616, 0627, 7788

. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Citric Acid	77-92-9	99 - 100%	Yes

. Hazards Identification

Emergency Overview

WARNING! CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 1 - Slight
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion:
Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Extremely large oral dosages may produce gastrointestinal disturbances. Calcium deficiency in blood may result in severe cases of ingestion.

Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact:
Highly irritating; may also be abrasive.

Chronic Exposure:
Chronic or heavy acute ingestion may cause tooth enamel erosion.

Aggravation of Pre-existing Conditions:
No adverse health effects expected.

First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally.

Get medical attention immediately.

. Fire Fighting Measures

Fire:
Autoignition temperature: 1011C (1852F) As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

Explosion:
Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

. Accidental Release Measures

'entilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, 'eventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial , entilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Physical and Chemical Properties

Appearance:
White granules.

Odor:
Odorless.

Solubility:
ca. 60 g/100 ml @ 20C (Anhydrous)

Density:
1.542

pH:
2.2 (0.1 N sol)

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
No information found.

Melting Point:
ca. 100C (ca. 212F)

Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
No information found.

Evaporation Rate (BuAc=1):

No information found.

0. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Metal nitrates (potentially explosive reaction), alkali carbonates and bicarbonates, potassium tartrate. Will corrode copper, zinc, aluminum and their alloys.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

1 Toxicological Information

Oral rat LD50: 3 g/kg; irritation skin rabbit: 500 mg/24H mild; eye rabbit: 750 ug/24H severe.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Citric Acid (77-92-9)	No	No	None

2. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

3. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options.

State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

4. Transport Information

Not regulated.

5. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Citric Acid (77-92-9)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Citric Acid (77-92-9)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Citric Acid (77-92-9)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Citric Acid (77-92-9)	No	No	No

emical Weapons Convention: No TSCA 12(b): No CDTA: No
RA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
activity: No (Pure / Solid)

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

6. Other Information

NFPA Ratings: Health: 2 **Flammability:** 1 **Reactivity:** 0

Label Hazard Warning:
WARNING! CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

Label Precautions:
Avoid contact with eyes, skin and clothing. Avoid breathing dust. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
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MATERIAL SAFETY DATA SHEET

I PRODUCT IDENTIFICATION

Trade Name:	Tungsten	**Synonym:**	Tungsten Metal Products
Chemical Nature:	Refractory Family	**Formula:**	W
CAS #:	7440-33-7	**Molecular Weight:**	183.85

II HAZARDOUS INGREDIENTS

TLV (Units): 96.5-100 % by Wt 5mg/m^3 ACGIH TLV **Sec.302 (EHS):** No **Sec.304 RQ:** No **Sec.313:** No

III PHYSICAL DATA

Boiling Point 760 mm Hg:	5660 °C	**Melting Point:**	3390 to 3430 °C
Specific Gravity:	19.35	**Vapor Density:**	N/A
% Volatiles by Weight:	0	**Solubility in H_2O:**	Insoluble
Appearance and Odor:	Gray Metal/ No odor	**How Best Monitored:**	Air Sample

IV FIRE AND EXPLOSION HAZARDS DATA

Flash Point (Method used): N/A **Autoignition Temperature:** N/A
Flammable Limits: Upper: N/A **Lower:** N/A

Extinguishing Media: Tungsten rod, wire and fabricated products are not a fire hazard. Fine dust generated during grinding operations may ignite if allowed to accumulate and subjected to an ignition source. Cover burning material with an inert powder, such as dry sand or limestone, to exclude oxygen.

Special Fire Fighting Procedures: For a powder fire confined to a small area, use a respirator approved for toxic dusts and fumes. For a large fire involving this material, firefighters should use self-contained breathing apparatus.

Unusual Fire and Explosion Hazards: Dust may present a fire or explosion hazard under favoring conditions of particle size, dispersion and strong ignition source. However, this is not expected to be a problem under normal handling conditions.

V HEALTH HAZARD INFORMATION

Threshold Limit Value: 5 mg/m^3

Health hazards (acute and chronic): To the best of our knowledge the chemical, physical and toxicological properties of tungsten metal have not been thoroughly investigated and recorded. Tungsten compounds: industrially, this element does not constitute an important health hazard. Exposure is related chiefly to the dust arising from the crushing and milling of the two chief ores of tungsten, namely scheelite and wolframite. Large overdoses cause central nervous system disturbances, diarrhea, respiratory failure and death in experimental animals (Sax, Dangerous Properties of Industrial Materials, eighth edition).

Inhalation: Acute: May cause irritation to the respiratory tract.
Chronic: No chronic health effects recorded.

gestion: Acute: No acute health effects recorded.
ıronic: Large overdoses may cause nervous system disturbances, and diarrhea.

Skin: Acute: May cause abrasive irritation.
Chronic: No chronic health effects recorded.

Eye: Acute: May cause abrasive irritation.
Chronic: No chronic health effects recorded.

Target Organs: May affect the respiratory and central nervous systems.
Medical Conditions Generally Aggravated by Exposure: Pre-existing respiratory disorders.

Effects of Over Exposure: Dust, mist and fumes generated during physical or metallurgical treatment may cause mild irritation of the nose and throat. With the exception of two Russian studies that found early signs of pulmonary fibrosis in some workers exposed to tungsten trioxide, tungsten metal and tungsten carbide, most studies have shown tungsten to be toxicologically inert. Skin and eye contact may cause irritation due to abrasive action of the dust. Current scientific evidence indicates no adverse effects are likely from accidental ingestion of small amounts of tungsten.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove victim to fresh air, keep warm and quiet, give oxygen if breathing is difficult and seek medical attention if symptoms persist.
INGESTION: Give 1-2 glasses of milk or water and induce vomiting, seek medical attention if symptoms persist. Never induce vomiting or give anything by mouth to an unconscious person.
EYE: Flush eyes with lukewarm water, lifting upper and lower eyelids, for at least 15 minutes. Seek medical attention if symptoms persist.
SKIN: Remove contaminated clothing, brush material off skin, wash affected area with mild soap and water, seek medical attention if symptoms persist.

VI REACTIVITY DATA

Stability: Stable

Incompatibility (Material to Avoid): Avoid contact of dust with strong oxidizers. Bromine pentafluoride, bromine, chlorine trifluoride, potassium perchlorate, potassium dichromate, nitryl fluoride, fluorine, oxygen difluoride, iodine pentafluoride, hydrogen sulfide, sodium peroxide, lead (IV) oxide, air.

Hazardous Decomposition Products: None
Hazardous Polymerization: Will not occur

VII SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled: Ventilate area of spill. Take care not to raise dust. Use non-sparking tools. Clean-up using methods which avoid dust generation such as vacuuming (with appropriate filter to prevent airborne dust levels which exceed the TLV), wet dust mop or wet clean-up. If airborne dust is generated, use an appropriate NIOSH approved respirator.

Waste Disposal Method: Dispose of in accordance with local, state and federal regulations.

VIII SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type): Use an appropriate NIOSH approved respirator when airborne dust concentrations exceed the TLV. Appropriate requirements set forth in 29CF19110.134 should be met.

Ventilation: Use local exhaust ventilation which is adequate to limit personal exposure to levels which do not exceed the TLV. If such equipment is not available, use respirators as specified above.

Protective Gloves: Rubber gloves

Eye Protection: Safety Glasses

Other Protective Equipment: Protective gear suitable to prevent contamination.

Work/hygienic Practices: Implement engineering and work practice controls to reduce and maintain concentration of exposure at v levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work areas. Wash thoroughly before ing and smoking. Do not blow dust off clothing or skin with compressed air.

IX SPECIAL PRECAUTIONS

Other Handling and Storage Conditions: Maintain good housekeeping procedures to prevent accumulation of dust. Use clean-up methods which minimize dust generation such as vacuuming or wet clean-up. If airborne dust is generated, use an appropriate NIOSH approved respirator. Wash thoroughly after handling and before eating or smoking and at the end of the work shift. Do not shake clothing or other items to remove dust. Use a vacuum. Avoid dust inhalation and direct skin contact. Do not ingest. Tungsten metal may ignite on contact with air. Handle and store in a controlled environment and inert gas such as argon.

Prepared by: S. Dierks
Dated: January 1991