PHOTOGRAPHERS' FORMULARY

FORMULARY IRON BLUE TONER

TO MAKE 1 LITER OF TONING SOLUTION

Formulary Iron Blue toner is an inexpensive but effective toner that is equivalent to Ansco Toner 241. The toner will work on most papers, but each type of paper will yield a slightly different tone.

Blue toning is a favorite of those photographers working with winter or water scenes. Just a hint of blue enhances the impression of winter snow, and softens an otherwise stark photo.

A number of different formulations for iron blue toners have been published. All of the formulations are based upon the formation of Prussian blue.

The chemicals in this kit give a brilliant blue tone. To allow you to vary the blue color to a softer, blue-gray tone, this kit also contains borax for the preparation of an after-bath.

CHEMICALS CONTAINED IN THIS KIT

CHEMICAL	AMOUNT
Potassium Ferricyanide	8 g
Ferric Ammonium Citrate*	8 g
Borax	5 g
Succinic Acid	37 g

*Ferric Ammonium Citrate is somewhat light sensitive and should be stored in the dark or a dark brown container.

FOR YOUR CHEMICAL SAFETY

All chemicals are dangerous and must be treated with respect. Please read the Chemical warnings on each package.

POTASSIUM FERRICYANIDE: In spite of the fact that this compound contains cyanide, it is not particularly toxic. The reason is that the cyanide groups are bound to the iron atom and are not free to act as a poison. The cyanide groups can be released as hydrogen cyanide gas if the potassium ferricyanide is placed in a strong acid solution; however, a high concentration of strong acid (such as hydrochloric acid) is not used in the iron blue toning process. Succinic is not sufficiently strong to release the cyanide ions.

To dispose of excess potassium ferricyanide (solid or in solution), wash the material down the drain with excessive amounts of water.

Consult with local sewer and water authorities regarding proper disposal of darkroom chemicals in your area.

The user assumes all risks upon accepting these chemicals. IF FOR ANY REASON YOU DO NOT WISH TO ASSUME ALL RISKS, PLEASE RETURN THE CHEMICALS WITHIN 30 DAYS FOR A FULL REFUND.

CAUTION: Never use metal utensils or containers in the preparation of or the use of toning solutions.

MIXING THE STOCK SOLUTIONS

We recommend you wear a dust mask, splash goggles, rubber gloves and a rubber apron anytime you are mixing dry chemicals. Use distilled water.

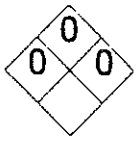
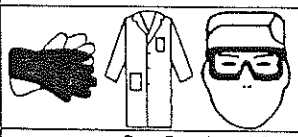
You will need a glass or plastic temporary mixing container, one with a capacity of 1000 ml to mix the toning solution. You will also need a 1-liter brown storage container to store the mixed toning solution and a second 1-liter container if you prepare the borax after-bath.

10-0260

SPECTRUM®

Gardena, CA

Material Safety Data Sheet

NFPA	HMIS		Personal Protective Equipment
	Health Hazard	2	
	Fire Hazard	0	
	Reactivity	0	See Section 15.

Section 1. Chemical Product and Company Identification

Common Name/ Trade Name	**Sodium borate** Borax
Manufacturer	SPECTRUM CHEMICAL MFG. CORP. 14422 SOUTH SAN PEDRO STREET GARDENA, CALIFORNIA 90248-9985
Commercial Name(s)	Not available
Synonym	Sodium pyroborate Borax
Chemical Name	Sodium tetraborate decahydrate
Chemical Family	Not available.
Chemical Formula	Na2B4O7.10(H2O)
Supplier	SPECTRUM QUALITY PRODUCTS 14422 S. SAN PEDRO STREET GARDENA, CA 90248-9985

Code	S3721
CAS#	1303-96-4
RTECS	SC7310000
TSCA	On the TSCA list.
CI#	Not available.

In case of emergency

CHEMTREC (24hr) 800-424-9300

Emergency phone: (310) 516-8000

Section 2. Composition and Information on Ingredients

Name	CAS#	Exposure Limits TWA (mg/m3)	STEL (mg/m3)	CEIL (mg/m3)	% by Weight
Sodium borate	1303-96-4				100

Toxicological Data on Ingredients: Sodium borate:

Section 3. Hazards Identification

Potential Acute Health Effects: Slightly dangerous to dangerous in case of skin contact (irritant), of eye contact (irritant). Very slightly to slightly dangerous in case of skin contact (permeator), of ingestion, of inhalation. This product may irritate eyes and skin upon contact.

Potential Chronic: CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. Toxicity of the product to the reproductive system: Not available. There

Health Effects	is no known effect from chronic exposure to this product. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. COLD water may be used. DO NOT use an eye ointment. Seek medical attention.
Skin Contact	If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical touches the victim's exposed skin, such as the hands: Neutralize exposed skin with a dilute solution of boric acid or acetic acid. Gently and thoroughly wash the contaminated skin with running water and non- abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. COLD water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.
Hazardous Skin Contact	Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.
Inhalation	Allow the victim to rest in a well ventilated area. Seek immediate medical attention.
Hazardous Inhalation	No additional information.
Ingestion	Remove dentures if any. Have conscious person drink several glasses of water or milk. INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. NEVER give an unconscious person anything to ingest. Seek medical attention.
Hazardous Ingestion	No additional information.

Section 5. Fire and Explosion Data

Flammability of the Product	Non-flammable.
Auto-Ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.

Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion in Presence of Various Substances	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. No specific information is available in our database regarding the product's risks of explosion in the presence of various materials.
Fire Fighting Media and Instructions	Non-flammable.
Special Remarks on Fire Hazards	Non combustible.
Special Remarks on Explosion Hazards	No additional remark.

Section 6. Accidental Release Measures

Small Spill	Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of acetic acid. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.
Large Spill	Our database contains no additional information in case of a spill and/or a leak of the product. Use a shovel to put the material into a convenient waste disposal container. Neutralize the residue with a dilute solution of acetic acid. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7. Handling and Storage

Precautions	DO NOT breathe dust. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes. Keep away from incompatibles as oxidizing agents.
Storage	No specific storage is required. Use shelves or cabinets sturdy enough to bear the weight of the chemicals. Be sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Use process enclosures, local exhaust ventilation, or other engeneering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Splash goggles. Lab coat. Gloves (impervious).
Personal	Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient;

Protection in Case of a Large Spill	
Exposure Limits	TWA: 0.31 (ppm) TWA: 5 (mg/m) from ACGIH [1995] Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance	Solid. (Solid crystalline
Molecular Weight	381.37
pH (1% soln/water)	10
Odor	Odorless.
Taste	Not available.
Color	White.
Boiling Point	Decomposes.
Melting Point	75.C (167.F)
Critical Temperature	Not available.
Specific Gravity	1.73 (Water = 1)
Vapor Pressure	Not available.
Vapor Density	Not available.
Volatility	Not available.
Odor Threshold	Not available.
Evaporation rate	Not available.
Viscosity	Not available.
Water/Oil Dist. Coeff.	Not available.
Ionicity (in Water)	Not available.
Dispersion Properties	See solubility in water.
Solubility	Soluble in cold water, hot water. Insoluble in methanol.

Section 10. Stability and Reactivity Data

Stability	The product is stable.
Instability Temperature	Not available.
Conditions of Instability	No additional remark.
Incompatibility with Various Substances	Slightly reactive to reactive with oxidizing agents.
Corrosivity	Non-corrosive in presence of glass.
Special Remarks on Reactivity	No additional remark.
Special Remarks on Corrosivity	No additional remark.

Section 11. Toxicological Information

Routes of Entry	Ingestion.

Other Classifications

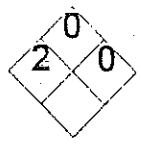
WHMIS (Canada)

DSCL (EEC)

HMIS (U.S.A.)

Health Hazard	0
Fire Hazard	0
Reactivity	0
Personal Protection	

National Fire Protection Association (U.S.A.)



Personal Protective Equipment

Protective Gloves (impervious).

Lab coat.

Splash goggles.

Section 16. Other Information

References	-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.		
Catalog Number(s)	S1180, S1181, S1183, S1185, S1186		
Other Special Considerations	No additional remark.		
Validated by	E. Brull on 12/17/96.	**Verified by Name**	E. Brull.
Emergency Phone:	(310)516-8000		
Notice to Reader	All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Spectrum Chemical Mfg. Corp. assumes no responsibility for the completeness or accuracy of the information contained herein.		

Toxicity to Animals	Acute oral toxicity (LD50): 2660 mg/kg (Rat.).
Chronic Effects on Humans	Toxicity of the product to the reproductive system: Not available.
Other Toxic Effects on Humans	Slightly dangerous to dangerous in case of skin contact (irritant), of eye contact (irritant). Very slightly to slightly dangerous in case of skin contact (permeator), of ingestion, of inhalation.
Special Remarks on Toxicity to Animals	No additional remark.
Special Remarks on Chronic Effects on Humans	No additional remark.
Special Remarks on other Toxic Effects on Humans	Ingestion of 5-10 grams has produced severe vomiting, diarrhea, shock and death.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Products of Biodegradation	Some metallic oxides.
Toxicity of the Products of Biodegradation	The products of degradation are more toxic.
Special Remarks on the Products of Biodegradation	No additional remark.

Section 13. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local or regional authorities.

Section 14. Transport Information

DOT Classification	Not a DOT controlled material (United States).
Identification	Not applicable (PIN and PG).
Special Provisions for Transport	Not applicable.
DOT (Pictograms)	

Section 15. Other Regulatory Information and Pictograms

Federal and State Regulations

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires emergency planning based on Threshold Planning Quantities (TPQs) and release reporting based on Reportable Quantities (RQs) in 40 CFR 355 (used for SARA 302, 304, 311 and 312). Components present in this product at a level which could require reporting under the statute are:

NONE

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III requires submission of annual report release of toxic chemicals that appear in 40 CFR 372 (used for SARA 313). This information must be included in all MSDSs that are copied and distributed for this material. Components present in this product at a level which could require reporting under the statute are:

NONE

WARNING: This product contains a chemical known to the State of California to cause cancer. Chemical ingredient(s) requiring this warning:

NONE

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Chemical ingredient(s) requiring this warning: NONE

Other Classifications

WHMIS (Canada)

Section 16. Other Information

References	-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -SAX, N.I. Dangerous Properties of Indutrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.		
Catalog Number(s)	S1180, S1181, S1183, S1185, S1186		
Other Special Considerations	No additional remark.		
Validated by	E. Brull on 12/17/96.	**Verified by Name**	E. Brull.
Emergency Phone:	(310)516-8000		
Notice to Reader	All chemicals may pose unknown hazards and should be used with caution. This Material Safety Data Sheet (MSDS) applies only to the material as packaged. If this product is combined with other materials, deteriorates, or becomes contaminated, it may pose hazards not mentioned in this MSDS. It shall be the user's responsibility to develop proper methods of handling and personal protection based on the actual conditions of use. While this MSDS is based on technical data judged to be reliable, Spectrum Chemical Mfg. Corp. assumes no responsibility for the completeness or accuracy of the information contained herein.		

8130 LACKLAND, ST. LOUIS, MO 63114 TEL. 314-428-4300 FAX 314-428-4366

JOST CHEMICAL

MATERIAL SAFETY DATA SHEET

FERRIC AMMONIUM CITRATE FCC/USP
CODE #2390, 2391, 2392, 2393,2399 & 6391

EMERGENCY PHONE NUMBER
Call 314-428-4300 during business hours 7 a.m. – 4 p.m. (CST)
or 314-370-8614

EFFECTIVE DATE
7/16/02

SECTION 1 PRODUCT IDENTIFICATION

CHEMICAL NAME:	Ferric Ammonium Citrate
SYNONYMS:	Iron Ammonium Citrate
CHEMICAL FORMULA:	A complex salt of undetermined structure
FORMULA CAS NO.:	1185-57-5
HAZARDOUS INGREDIENTS:	Ferric Ammonium Citrate

SECTION 2 SUMMARY OF HAZARDS

PRECAUTIONARY MEASURES:	Warning! May cause irritation. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling.
EMERGENCY FIRST AID:	In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes.
DOT HAZARD CLASS:	Not regulated.

SECTION 3 PHYSICAL DATA

APPEARANCE:	Greenish or red granules or brownish-yellowish powder
ODOR:	Odorless with mild ferruginois taste
SOLUBILITY:	25g in 100 H_2O @ 20°C

SECTION 4 FIRE AND EXPLOSION HAZARD DATA

FIRE:	Fire is possible at elevated temperatures or by contact with an ignition source.
EXPLOSION:	Not considered to be an explosion hazard.
FIRE EXTINGUISHING MEDIA:	Water fog, carbon dioxide, dry chemicals.

SPECIAL INFORMATION: In the event of a fire, wear full protective clothing and NIOSH-approved self contained breathing apparatus with full face piece operating in the pressure demand or other positive pressure mode.

SECTION 5 REACTIVITY DATA

STABILITY: Stable under normal conditions

CONDITION/MATERIAL TO AVOID: Not established.

HAZARDOUS DECOMPOSITION PRODUCTS: Ammonia, NO_X

HAZARDOUS POLYMERIZATION: This substance does not polymerize

SECTION 6 HEALTH HAZARD INFORMATION

A. EXPOSURE/HEALTH EFFECTS

INHALATION: Inhalation of high concentrations of dust may cause nasal or lung irritation.

INGESTION: Ingestion can produce gastrointestinal irritation.

SKIN CONTACT: Contact may cause irritation or rash, particularly with moist skin.

EYE CONTACT: Redness, tearing, possible abrasion can occur.

CHRONIC EXPOSURE: No information found.

B. FIRST AID

INHALATION: Remove to fresh air. Get medical attention for any breathing difficulty.

INGESTION: If large amounts were swallowed, get medical advice.

SKIN CONTACT: Remove any contaminated clothing. Wash skin with plenty of water. If irritation develops, get medical attention.

EYE CONTACT: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA

None found. Material is generally recognized as safe for use in foods.

SECTION 7 LEAK/SPILL INFORMATION

SPILL CONTROL & RECOVERY:	Sweep, scoop or pick up spilled material. Collected waste may be transferred to a closed, preferably plastic, container and sent to an approved waste disposal facility.
DISPOSAL:	Ensure compliance with local, state and federal regulations.

SECTION 8 OCCUPATIONAL CONTROL MEASURES

AIRBORNE EXPOSURE LIMITS:	The TLV has been established at 1 mg/m^3 by ACGIC (as Iron)
VENTILATION SYSTEMS:	A local exhaust system which captures the contaminant at its source is recommended to prevent dispersion of the of the contaminant into the workroom air.
PERSONAL RESPIRATORS:	Where exposure to the dust is apparent, a dust/mist respirator may be worn.
SKIN PROTECTION:	Wear protective gloves and clean body covering clothing.
EYE PROTECTION:	Use chemical safety goggles and/or full face shield where dusting or splashing of solution is possible.

SECTION 9 STORAGE AND SPECIAL INFORMATION

Keep in tightly closed container, protect from light and store in cool, dry, ventilated area. Protect against physical damage.

****

While Jost Chemical Co. believes that the data contained herein are factual, they are not to be taken as a warranty or representation for which Jost Chemical Co. assumes legal responsibility. They are offered solely for your consideration and investigation. Any use of these data and information must be determined by the user to be in accordance with the applicable Federal, State, and local laws and regulations.

Material Safety Data Sheet

WEGO CHEMICAL & MINERAL CORP

265 Great Neck Road

Great Neck, NY 11021

Ph: (516) 487 3510; Fax: (516) 487 3794; email: sales@wegochem.com

Date of Revision: 3/2002 **Potassium Ferricyanide**

Section 1 - Chemical Product and Company Identification

Product/Chemical Name: POTASSIUM FERRICYANIDE
Chemical Formula: $K_3Fe(CN)_6$
CAS Number: 13746-66-2
Other Designations: Potassium Hexacyanoferrate (III); Red Prussiate of Potash
Derivation:
General Use: Used in photography, electroplating, and as a mild oxidizing agent in organic synthesis.
Emergency Telephone: 1-800-424-9300 (Chemtrec)

Section 2 - Composition / Information on Ingredients

Ingredient Name	CAS Number	EINECS/ELINCS	% wt *or* % vol
Potassium Ferricyanide	13746-66-2	237-323-3	99

Trace Impurities:

	OSHA PEL		ACGIH TLV		NIOSH REL		NIOSH
Ingredient	TWA	STEL	TWA	STEL	TWA	STEL	IDLH
Potassium Ferricyanide	5 mg CN/m^3	none estab.	5 mg CN/m^3 (NaCN and KCN, Specifically)	none estab.	5 mg CN/m^3	none estab.	5 mg CN/m^3 (NaCN and KCN, Specifically)

Section 3 - Hazards Identification

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

HMIS	
H	2
F	1
R	1
PPE†	
†See 8	

Potential Health Effects

Primary Entry Routes: Skin contact or absorption, inhalation.
Target Organs: Cardiovascular system, CNS, liver, kidneys, skin.
Acute Effects

Inhalation: May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath. Cyanide anions (CN^-) inhibit the body cells' use of oxygen by causing metabolic asphyxiation. Prolonged anoxia (reduced level of oxygen in the blood) causes central nervous system (CNS) damage. Early symptoms of exposure to potassium ferricyanide are typical CNS effects like weakness, headache, and confusion. Continued exposure causes a weak and irregular heartbeat, unconsciousness, convulsions, coma, and death. Cyanides are fast acting and highly poisonous by ingestion. As little as a few breaths of HCN vapor may stop respiration and cause collapse.
Eye: May cause irritation, redness and pain.
Skin: May cause irritation with redness and pain.
Ingestion: Large doses may cause gastrointestinal upset with nausea, vomiting, diarrhea, and possible cramping.
Carcinogenicity: Potassium ferricyanide is not listed as a carcinogen by the NTP, IARC, or OSHA.
Medical Conditions Aggravated by Long-Term Exposure: Diseases of kidneys, heart, lungs, and the CNS.
Chronic Effects: Dermatitis and skin ulcers.

Section 4 - First Aid Measures

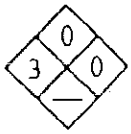
Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.
Skin Contact: Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.
Ingestion: Call a poison control center. Never give anything by mouth to someone who is unconscious or convulsing.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Comments: Preparation for emergency first aid treatment involving potassium ferricyanide or any cyanide salt must be done before the exposure situation occurs. All workers involved with cyanides must receive detailed training in safe handling, first aid procedures, and the use of commercially available cyanide antidote kits.

Section 5 - Fire-Fighting Measures

NFPA



Flash Point: Not Combustible
Flash Point Method:
Burning Rate:
Autoignition Temperature: Not Combustible
LEL:
UEL:
Flammability Classification:
Extinguishing Media: Unreacted cyanide salts like potassium ferricyanide are not combustible; however, contact with acids will liberate highly toxic, flammable hydrogen cyanide (HCN) gas. Use water spray to fight fires in areas containing this material. Cool fire-exposed metal containers with large amounts of water. Do *not* use carbon dioxide (CO_2) extinguishers; this can liberate HCN by the action of the dissolved CO_2.
Unusual Fire or Explosion Hazards: Not considered to be an explosion hazard.
Hazardous Combustion Products:
Fire-Fighting Instructions: Do not release runoff from fire control methods to sewers or waterways.
Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode.

Section 6 - Accidental Release Measures

Spill /Leak Procedures: Notify safety personnel. Provide adequate ventilation. Scrupulously avoid the addition of any acid to the spill or leak area. Scoop up spilled potassium ferricyanide into suitable containers for disposal. Carefully sweep or vacuum up small spills or residues without creating dust. Preplan and train personnel for emergency response.

Large Spills

Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Cleanup: Cleanup personnel need protection against contact and inhalation.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Protect this material from the light. Protect containers from physical damage. Prevent this material's contact with skin and eyes. Do not taste it or breathe its dust or solution mist. Regularly inspect and maintain the cyanide first aid kits that must be available in all work and storage areas.

Storage Requirements: Store potassium ferricyanide in a cool, dry, well-ventilated, airtight area away from ammonia, chromium trioxide, oxidizing materials, and acids.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: All handling and storage facilities must be designed to prevent accidental contact with acids.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

Administrative Controls: Preplan and train personnel for emergency response.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or non-routine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Contact lenses are not eye protective devices. Appropriate eye protection must be worn instead of, or in conjunction with contact lenses.

Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work area.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove this material from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: solid
Appearance and Odor: Bright red, crystalline powder/ Odorless.
Odor Threshold:
Vapor Pressure:
Vapor Density (Air=1):
Formula Weight:
Density:
Specific Gravity (H_2O=1, at 4 °C): 1.85
pH:

Water Solubility: Slowly soluble in 2.5 parts cold water
Other Solubilities:
Boiling Point:
Freezing/Melting Point:
Viscosity:
Refractive Index:
Surface Tension:
% Volatile:
Evaporation Rate:

Section 10 - Stability and Reactivity

Stability: Stable under ordinary conditions of use and storage.
Polymerization: Hazardous polymerization cannot occur.
Chemical Incompatibilities: Ammonia, chromium trioxide + heat, cupric nitrate, sodium nitrite + heat, acids and acid fumes.
Conditions to Avoid: Light, heat, incompatibles.
Hazardous Decomposition Products: When heated to decomposition or comes in contact with acid or acid fumes it emits toxic fumes of cyanides. Emits toxic fumes of cyanide and oxides of nitrogen when heated to decomposition.

Section 11- Toxicological Information

Toxicity Data:*

Rat, Oral, LD_{Lo}: 1600 mg/kg

* See NIOSH, *RTECS* (L18225000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity:
Environmental Fate:
Environmental Degradation:
Soil Absorption/Mobility:

Section 13 - Disposal Considerations

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
Disposal Regulatory Requirements:
Container Cleaning and Disposal:

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101): Not regulated

Shipping Name:
Shipping Symbols:
Hazard Class:
ID No.:
Packing Group:
Label:
Special Provisions (172.102):

Packaging Authorizations
a) Exceptions:
b) Non-bulk Packaging:
c) Bulk Packaging:

Quantity Limitations
a) Passenger, Aircraft, or Railcar:
b) Cargo Aircraft Only:

Vessel Stowage Requirements
a) Vessel Stowage:
b) Other:

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 13746-66-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 13746-66-2 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level: None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
XN
Risk Phrases:
R 21/22 Harmful in contact with skin and if swallowed.
Safety Phrases:
S 2 Keep out of reach of children. S 22 Do not inhale dust. S 24/25 Avoid contact with skin and eyes.
WGK (Water Danger/Protection)
CAS# 13746-66-2: 2
Canada
CAS# 13746-66-2 is listed on Canada's DSL/NDSL List.
WHMIS: Not available.
CAS# 13746-66-2 is not listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

Disclaimer: All information, recommendations and suggestions appearing herein are based upon sources believed to be reliable: However, it is the users responsibility to determine the safety, toxicity and suitability for its own use of this product. WEGO CHEMICAL & MINERAL CORP. DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE USE BY OTHERS OF THIS PRODUCT.

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MAY 15 1998

SPECTRUM®

ISO 9002 CERTIFIED

GARDENA, CA
NEW BRUNSWICK, NJ

Material Safety Data Sheet

NFPA	HMIS	Personal Protective Equipment
	Health Hazard 2 Fire Hazard 1 Reactivity 0	 See Section 15

Section 1. Chemical Product and Company Identification

Common Name/ Trade Name	**Succinic acid**
Manufacturer	SPECTRUM CHEMICAL MFG. CORP. 14422 SOUTH SAN PEDRO STREET GARDENA, CALIFORNIA 90248
Commercial Name(s)	Not available.
Synonym	Butanedioic acid
Chemical Name	
Chemical Family	Not available.
Chemical Formula	(CH2COOH)2
Supplier	SPECTRUM QUALITY PRODUCTS, INC. 14422 SOUTH SAN PEDRO STREET GARDENA, CA 90248

Code	S5040
CAS#	110-15-6
RTECS	WM4900000
TSCA	On the TSCA list.
CI#	Not available.

IN CASE OF EMERGENCY
CHEMTREC (24hr) 800-424-9300
Emergency phone: (310)516-8000

Section 2.Composition and Information on Ingredients

		Exposure Limits			
Name	CAS #	TWA (mg/m³)	STEL (mg/m³)	CEIL (mg/m³)	% by Weight
Succinic acid	110-15-6				100

Toxicological Data on Ingredients

Succinic acid
LD50: Not available.
LC50: Not available.

Section 3. Hazards Identification

Potential Acute Health Effects

Slightly dangerous to dangerous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. This product may irritate eyes and skin upon contact.

Potential Chronic Health Effects

CARCINOGENIC EFFECTS: Not available. **MUTAGENIC EFFECTS**: Not available. **TERATOGENIC EFFECTS**: Not available. Toxicity of the product to the reproductive system: Not available. There is no known effect from chronic exposure to this product. Repeated or prolonged exposure is not known to aggravate medical condition.

Continued on Next Page

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. COLD water may be used. DO NOT use an eye ointment. Seek medical attention.
Skin Contact	If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical touches the victim's exposed skin, such as the hands: Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. COLD water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.
Serious Skin Contact	Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.
Inhalation	Allow the victim to rest in a well ventilated area. Seek immediate medical attention.
Serious Inhalation	No additional information.
Ingestion	Remove dentures if any. Have conscious person drink several glasses of water or milk. INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. NEVER give an unconscious person anything to ingest. Seek medical attention.
Serious Ingestion	No additional information.

Section 5. Fire and Explosion Data

Flammability of the Product	Combustible.
Auto-Ignition Temperature	Not available.
Flash Points	OPEN CUP: 160°C (320°F)
Flammable Limits	Not available.
Products of Combustion	These products are carbon oxides (CO, CO2).
Fire Hazards in Presence of Various Substances	No specific information is available in our database regarding the flammability of this product in presence of various materials.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. No specific information is available in our database regarding the product's risks of explosion in the presence of various materials.
Fire Fighting Media and Instructions	SMALL FIRE: Use DRY chemicals, CO2, water spray or foam. LARGE FIRE: Use water spray, fog or foam. DO NOT use water jet.
Special Remarks on Fire Hazards	No additional remark.
Special Remarks on Explosion Hazards	No additional remark.

Continued on Next Page

Section 6. Accidental Release Measures

Small Spill	Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.
Large Spill	Our database contains no additional information in case of a spill and/or a leak of the product. Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7. Handling and Storage

Precautions	Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. DO NOT breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible. Avoid contact with skin and eyes.
Storage	Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Use process enclosures, local exhaust ventilation, or other engeneering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.
Personal Protection	Splash goggles. Lab coat. Dust respirator. Be sure to use a MSHA/NIOSH approved respirator or equivalent. Gloves (impervious).
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
Exposure Limits	Not available.

Section 9. Physical and Chemical Properties

Physical state and appearance	Solid.	**Odor**	Not available.
Molecular Weight	118.09	**Taste**	Not available.
pH (1% soln/water)	Not available.	**Color**	Not available.
Boiling Point	Decomposes. (235 °C or 455°F)		
Melting Point	188°C (370.4°F)		
Critical Temperature	Not available.		
Specific Gravity	1.56 (Water = 1)		
Vapor Pressure	Not available.		
Vapor Density	Not available.		
Volatility	Not available.		
Odor Threshold	Not available.		
Water/Oil Dist. Coeff.	Not available.		
Ionicity (in Water)	Not available.		
Dispersion Properties	See solubility in water.		
Solubility	Partially soluble in cold water.		

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Section 10. Stability and Reactivity Data

Stability	The product is stable.
Instability Temperature	Not available.
Conditions of Instability	No additional remark.
Incompatibility with various substances	No specific information is available in our database regarding the reactivity of this material in presence of various other materials.
Corrosivity	Non-corrosive in presence of glass.
Special Remarks on Reactivity	No additional remark.
Special Remarks on Corrosivity	No additional remark.
Polymerization	No.

Section 11. Toxicological Information

Routes of Entry	Ingestion. Inhalation.
Toxicity to Animals	LD50: Not available. LC50: Not available.
Chronic Effects on Humans	Toxicity of the product to the reproductive system: Not available.
Other Toxic Effects on Humans	Slightly dangerous to dangerous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.
Special Remarks on Toxicity to Animals	No additional remark.
Special Remarks on Chronic Effects on Humans	No additional remark.
Special Remarks on other Toxic Effects on Humans	No additional remark.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Products of Biodegradation	These products are carbon oxides (CO, CO2).
Toxicity of the Products of Biodegradation	The products of degradation are more toxic.
Special Remarks on the Products of Biodegradation	No additional remark.

Section 13. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local or regional authorities.

Continued on Next Page

Section 14. Transport Information

DOT Classification	Not a DOT controlled material (United States).
Identification	Not applicable (PIN and PG).
Special Provisions for Transport	Not applicable.
DOT (Pictograms)	

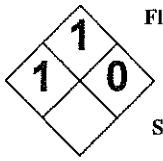
Section 15. Other Regulatory Information and Pictograms

Federal and State Regulations	The following product(s) is (are) listed on TSCA: **Succinic acid**
California Proposition 65 Warnings	WARNING: This product contains a chemical known to the State of California to cause cancer. Chemical ingredient(s) requiring this warning: NONE WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Chemical ingredient(s) requiring this warning: NONE
Other Regulations	OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): This product is on the Domestic Substances List (DSL), and is acceptable for use under the provisions of CEPA.
Other Classifications	**WHMIS (Canada)** Not controlled under WHMIS (Canada). **DSCL (EEC)** Not controlled under DSCL (Europe).

HMIS (U.S.A.)

Health Hazard	2
Fire Hazard	1
Reactivity	0
Personal Protection	e

National Fire Protection Association (U.S.A.)



WHMIS (Canada) (Pictograms)

DSCL (Europe) (Pictograms)

TDG (Canada) (Pictograms)

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ADR (Europe) (Pictograms)

Protective Equipment

Gloves (impervious).

Lab coat.

Dust respirator. Be sure to use a MSHA/NIOSH approved respirator or equivalent.

Splash goggles.

Section 16. Other Information

Catalog Number(s)	**S1685, S1686**
References	Not available.
Other Special Considerations	No additional remark.
Validated by E. Brull on 12/17/96.	**Verified by E. Brull. Printed 12/18/96.**
Emergency phone: (310)516-8000	