PHOTOGRAPHERS' FORMULARY

FORMULARY IRON GREEN/BLUE TONER

To make 1 liter of toning solution and 1 liter of sulfide stock solution
for Iron Green or Iron Blue toning.

This toner used to tone fiber-based print green or blue, depending on method of use. The green tones are true greens rather than the blue-green tones obtained with most green toners. The blue tone is a bright blue, brighter than Formulary Iron Blue. The toner should be mixed 12 to 24 hours before use and exposed to light for that time.

CHEMICALS CONTAINED IN THIS KIT

This kit contains the following chemicals:

POTASSIUM FERRICYANIDE	8g
FERRIC AMMONIUM CITRATE	8g
SODIUM SULFIDE	20g
SODIUM BISULFATE	6g

CHEMICAL SAFETY

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

SODIUM SULFIDE is not Sodium Sulfite. Sodium Sulfite (Na2SO3), a preservative used in almost all photographic developers, is considered to be a bland chemical. Sodium Sulfide (Na2S) is a powerful fogging agent and is used mainly in toning baths. It is considered to be a dangerous chemical unless it is used correctly.

Sodium Sulfide should be used with considerable care. Do not allow it to come into contact with acid or any acidic solutions, such as a stop bath or a fixer. Sodium Sulfide (as a solid or in solution) will react with acid to form Hydrogen Sulfide (H2S), a foul smelling and poisonous gas. Since this is exactly what you do in preparing the sulfide bath in this kit, please follow the directions carefully.

Sodium Sulfide and its solutions are caustic. Do not allow them to come into contact with the skin because they can cause a chemical burn. If contact should occur, wash the area first with cold water followed by soap and water.

Dispose of solid Sodium Sulfide or a solution of Sodium Sulfide down a drain. First, run cold tap water down the drain for about 5 minutes to make sure no acid remains in the drain trap. Place the solid or pour the liquid into the drain pipe. Finally, run tap water down the drain for at least 10 minutes.

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.

To dispose of excess Potassium Ferricyanide (solid or in solution), wash the material down the drain with excess water.

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

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

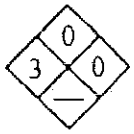
Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.
Skin Contact: Immediately flush skin with 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.

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.

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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.

10-1330

UNIVAR USA
6100 Carillon Point
Kirkland WA 98033
425-889-3400

For Emergency Assistance involving chemicals call - CHEMTREC (800) 424-9300

MSDS Number:PZ97636 MSDS Version:003

003 02/22/02 SODIUM SULFIDE

PRODUCT NAME: SODIUM SULFIDE
MSDS#: PZ97636
DATE ISSUED: 12/12/01
SUPERSEDES: 09/17/99
ISSUED BY: 008812

1. CHEMICAL PRODUCT

SYNONYMS: Sodium Menosulfide; Sulfur Compounds; Na2S

2. COMPOSITION7INFORMATION ON INGREDIENTS

Material/CAS Number Percent

Sodium Sulfide 59-62
1313-82-2

(Hydrated -- 38% water of crystallization)

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

DANGER! Contact with acid and excessive heat liberates flammable and poisonous Hydrogen sulfide gas. Corrosive - Causes severe burns to eyes and skin.

Precautions: Avoid contact with any acids or acidic materials. Forms poisonous gas, hydrogen sulfide (rotten egg odor), which also can cause fires and explosions. Breathing this gas can cause immediate death. The sense of smell becomes rapidly fatigued and cannot be relied upon to warn of the continuous presence of hydrogen sulfide gas. Do not get in eyes, on skin, or on clothing. May cause severe burns and permanent damage. Do not breathe dust or mists from solutions. Use only with adequate ventilation. Ventilation must be sufficient to minimize employee exposure to this product. Do not swallow. Wash thoroughly after handling. Do not eat, drink or smoke in work area.

4. FIRST AID MEASURES

INHALATION: Hydrogen sulfide has a characteristic "rotten egg" odor. Remove From area to fresh air. Contact a poison control center, emergency room Or physician right away as further treatment will be necessary.

EYE/SKIN CONTACT: EYE: Remove contact lens and pour a gentle stream of warm Water through the affected eye for at least 15 minutes. Contact a poison Control center, emergency room or physician right away as further treatment Will be necessary. SKIN: Run a gentle stream of water over the affected Area for 15 minutes. A mild soap may be used if available. Contact a Poison control center, emergency room or physician right away as further Treatment will be necessary.

INGESTION: Gently wipe or rinse the inside of the mouth with water. Sips of Water may be given if person is fully conscious. Never give anything by Mouth to an unconscious or convulsing person. Do not induce vomiting. Contact A poison control center, emergency room or physician right away as further Treatment will be necessary.

5. FIRE FIGHTING MEASURES

FLASH POINT: Non-flammable

EXTINGUISHING MEDIA: Not applicable.

SPECIAL FIREFIGHTING PROCEDURES: Contact with all acids or excessive heat will liberate poisonous, flammable hydrogen sulfide gas. Fire-fighters must wear NIOSH approved, pressure demand, self-contained breathing apparatus with full face piece for possible exposure to hazardous gases. Hydrogen sulfide vapors are heavier than air and may travel a considerable distance to source of ignition and flash back. The autoignition temperature of hydrogen sulfide is 500 deg F (260 deg C).

6. ACCIDENTAL RELEASE MEASURES

ACTION TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Immediately evacuate the area. Remove sources of ignition. Provide maximum ventilation. Unprotected personnel should move upwind of spill. Only personnel equipped with proper respiratory and eye/skin protection should be permitted in the area. Carefully shovel or sweep up spilled material and place into closed containers. Spilled material should be reclaimed if possible. Product must not come in contact with acids. After all visible traces have been removed, thoroughly wet vacuum the area. Do not flush to sewer. At the first sign of a hydrogen sulfide leak, a planned emergency program should be put into operation. Emergency drills should be made periodically. If a hydrogen sulfide leak occurs, all persons must promptly leave the area. A wind sock or other wind direction indicator should be within sight. Move crossways to the wind from the contaminated area. Insure that the entire area is evacuated. Only persons wearing NIOSH approved self-contained breathing apparatus or Full face piece airline respirators with auxiliary SCBA's operated in the Pressure/demand mode and eye/skin protection should be permitted in area. Each hydrogen sulfide leak should be dealt with immediately. Lead acetate Strips or portable monitoring instruments can be used to locate a hydrogen Sulfide leak. If hydrogen sulfide is leaking, the lead acetate paper will Turn brown. When working on a leak, employees should take a position so That escaping hydrogen sulfide moves away from them. Supplied air Equipment must be working no matter how small the leak.

7. HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORAGE:

Store away from strong oxidizing agents. Do not allow contact with acids and excessive heat. Will liberate poisonous, flammable hydrogen sulfide gas. Do not store in zinc, aluminum or copper containers. Wear respiratory protection whenever exposure to vapor is likely. Wear appropriate personal protective equipment. Store in a cool, dry, well-ventilated place. Store only in closed, properly labeled containers. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits:
8-hour Time Weighted Average (TWA); 15-minute Short-Term Exposure Limit (STEL)

OSHA: No occupational exposure limits have been established by OSHA for this product. The OSHA exposure limit for hydrogen sulfide is 10 ppm TWA, 15 ppm STEL, 29 CFR 1910.1000, Rev. 3/1/89; the currently enforceable 1971 limit is 20 ppm ceiling.

ACGIH: No occupational exposure limits have been established by ACGIH for this Product. The ACGIH TWA for hydrogen sulfide is 10 ppm, and the STEL is 15 ppm.

Vendor (IPEL): No occupational exposure limits have been established by the vendor for this product. The Vendor IPEL for hydrogen sulfide is 10 ppm TWA, 15 ppm STEL.

RESPIRATORY PROTECTION: If exposure of hydrogen sulfide gas could exceed the exposure limits, use NIOSH approved full face airline and/or self-contained breathing apparatus operated in a positive pressure demand mode. The respiratory use limitations made by NIOSH or the manufacturer must be observed. Respiratory protection programs must be in accordance with 29 CFR 1910.134.

NOTE: Since the most critical hazard in working with this product is Exposure to hydrogen sulfide gas, Vendor recommends you consider the Installation of a continuous monitoring hydrogen sulfide gas detection and

Alarm system in any area where hazardous levels of hydrogen sulfide gas May occur. This safety measure has been recommended by NIOSH (National Institute for Occupational Safety and Health) in its publication entitled, "Criteria for a Recommended Standard...Occupational Exposure to Hydrogen Sulfide," U.S. May, 1977, publication No, DHEW (NIOSH) 77-158. Details Pertaining to training are outlined in this NIOSH publication.

VENTILATION: Use local exhaust or general room/dilution ventilation as appropriate to control employee exposures in the work place.

EYE AND FACE PROTECTION: Close fitting chemical safety goggles with faceshield.

PROTECTIVE GLOVES: Impervious or rubber gloves.

OTHER PROTECTIVE EQUIPMENT: Boots, aprons, or chemical suits should be used When necessary to prevent skin contact. Personal protective clothing and use of equipment must be in accordance with 29 CFR 1910.132 (general requirements), .133 (eye and face protection), and .138 (hand protection).

9. PHYSICAL AND CHEMICAL PROPERTIES

BOILING POINT: 346 deg F
VAPOR DENSITY (Air=1): NA
SPECIFIC GRAVITY (Water=1): 1.858 (flake)
pH: Strongly alkaline
FREEZING/MELTING POINT: 92 deg C (197 deg F)
SOLUBILITY (wt.% in water): 15% @ 68 deg F
BULK DENSITY: 40 lbs/cu.ft. (flake)
VOLUME % VOLATILE: Very low
VAPOR PRESSURE: Unknown
EVAPORATION RATE: NA
HEAT OF SOLUTION: Mildly exothermic
PHYSICAL STATE: Flakes
ODOR: Slight rotten egg.
COLOR: White to yellow.

10. STABILITY AND REACTIVITY

STABILITY: Stable

HAZARDOUS POLYMERIZATION: Will not occur.

INCOMPATIBILITY (CONDITIONS/MATERIALS TO AVOID):
Avoid contact with strong oxidizing agents and acids. Avoid concentrating solutions, could cause spontaneous ignition. Solutions attack zinc, copper, aluminum and alloys of these metals. Avoid heat, flames, sparks and other sources of ignition.

HAZARDOUS THERMAL DECOMPOSITION/COMBUSTION PRODUCTS:
Oxides of sulfur. Oxides of sodium. Hydrogen sulfide.

11. TOXICOLOGICAL INFORMATION

ACUTE INHALATION LC50: Unknown
ACUTE DERMAL LD50: 177.8 mg/kg. (rabbit) High toxicity.
SKIN IRRITATION: Corrosive.
EYE IRRITATION: Corrosive.
ACUTE ORAL LD50: 200 mg/kg. (rat) High toxicity.

CHRONIC EFFECTS/CARCINOGENICITY: This product is NOT listed as a carcinogen or suspected carcinogen by NTP, IARC, or OSHA.

MEDICAL CONDITIONS AGGRAVATED: None known.

EFFECTS OF OVEREXPOSURE:

ACUTE:
Irritation of mucous membranes, eyes, and respiratory tract is possible following exposure to the decomposition product, hydrogen sulfide gas, which is potentially lethal.
Ingestion: This material is quite corrosive and would produce burns of the Stomach lining capable of causing severe injury and death.

Eye/Skin: May cause irritation, severe burns and corrosion to the skin. This Material may be absorbed through the skin producing toxicity typical of Hydrogen sulfide poisoning. This product has similar effects as alkalies Following direct exposure to the eye and can cause lacrimation, sensitivity To light, tearing and irreversible damage, including blindness.

Hydrogen sulfide is a toxic and irritant gas whose effects are exerted on The respiratory system, gastrointestinal tract, eyes and central nervous System. Acute effects on the respiratory system, in order of increasing Severity, can be a runny nose with anosmia (loss of sense of smell), Tracheobronchitis with pain, cough, pulmonary edema with dyspnea (shortness Of breath), delayed bronchopneumonia, respiratory paralysis and terminal Asphyxial convulsion. Acute effects may occur without warning as a result Of olfactory fatigue. While the odor of hydrogen sulfide is distinct at 0.3 Ppm, olfactory fatigue occurs rapidly with continuous inhalation. Gastrointestinal effects can be profuse salivation, nausea, vomiting, vertigo, Amnesia, confusion and unconsciousness. Eye irritation of the conjunctiva With photophobia to severe conjunctivitis with keratitis. A possible Warning sign of eye exposure is the appearance of halos around light sources And increased sensitivity to light.

Note: The test data from rabbit studies demonstrate that this material has a dermal LD50 below 200 mg/kg. However, the extreme irritation experienced by skin contact precludes the likelihood that exposure to amounts sufficient to cause human illness would be encountered. vendor, therefore, considers that the irritating properties of this material and the long history of safe use obviates the need to label it a poison.

CHRONIC: The effects of long-term, low level exposures to this product have not been determined. Safe handling of this material on a long-term basis should emphasize the prevention of all contact with this material to avoid any effects from repetitive acute exposures.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION:

Toxic to aquatic life. 61 ppm (Bluegill Sunfish) 48-hour TLM LC50

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD:

Dispose of in an approved hazardous waste management facility. Care must be taken when using or disposing of chemical materials and/or their containers to prevent environmental contamination. It is your duty to dispose of the chemical materials and/or their containers in accordance with the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, as well as any other relevant Federal, State, or local laws/regulations regarding disposal.

14. TRANSPORT INFORMATION

Proper Shipping Name: Sodium Sulfide, Hydrated
Hazard Class: 8 (Corrosive)
Identification Number: UN1849
Packing Group: II

15. REGULATORY INFORMATION

USA TSCA: This product is listed on the TSCA Inventory.
EUROPE EINECS: This product is listed on EINECS. (215-211-5)
CANADA DSL: This product is listed on the Canadian DSL.
AUSTRALIA AICS: This product is listed on AICS.
KOREA ECL: This product is listed on ECL.
JAPAN MITI (ENCS): This product is listed on MITI
PHILIPPINES PICCS: This product is listed on the Philippines Inventory of Chemicals and Chemical Substances (PICCS)

SARA TITLE III:
SARA (311, 312) Hazard Class:
Acute Health Hazard. Reactive Hazard.
SARA (313) Chemicals:

Not listed.

SARA Section 302:

Not listed as an Extremely Hazardous Substance.

CANADA REGULATIONS (WHMIS): Class E - Corrosive Material. Class D1A-Very Toxic Materials. Product use: Chemical processing. Odor Threshold: 1-5 Ppm for hydrogen sulfide.

HAZARD RATING SYSTEM (HMIS/NFPA):

NFPA: Health 3, Flammability 1, Reactivity 1

16, OTHER INFORMATION

NA = Not Available

For Additional Information:
Contact: MSDS Coordinator - Vopak USA
During business hours, Pacific Time - (425) 889-3400

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END OF MSDS

10-1170

PRODUCT: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL

ORDER NO: 232929
PROD NO : 344820

PHOTOGRAPHERS FORMULARY
CALL IN ADVANCE TO MEET
7079 HWY 83 N.
BOX 89
CONDON ,MT 59826

UNIVAR USA INC. (425)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

---------- EMERGENCY ASSISTANCE ----------

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC
(800)424-9300

PRODUCT NAME:	SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL
MSDS NUMBER:	P12108VS
DATE ISSUED:	01/17/2005
SUPERSEDES:	03/01/2004
ISSUED BY:	008548

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MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Product Name: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL
Product Code: S8S01
Synonyms: Sodium acid sulfate, Nitre cake, Sodium hydrogen sulfate
Product Use: Cleaning compounds, pH adjustment
Manufacturer:
Jones-Hamilton Co.
Name/Address: 30354 Tracy Road

PRODUCT: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL

ORDER NO: 232929
PROD NO : 344820

Walbridge, OH 43465
24-Hour Emergency Phone Numbers (U.S.A.):
Ohio: (419) 666-9838
CHEMTREC: (800) 424-9300

SECTION 2 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Off-white granular material, with the consistency of salt.
WARNING: Causes eye irritation. May cause skin and respiratory tract irritation. Avoid contact with eyes and skin. Avoid breathing dust. Wash exposed skin thoroughly after handling.

Potential Health Effects: See Section 11 for more information. Likely Routes of Exposure: Eye contact, skin contact, inhalation.

Eye: Causes mild to severe irritation. May cause burn if not flushed with water.

Skin: Prolonged exposure may cause moderate irritation. May cause burn if not flushed with water.

Inhalation: Inhalation of dust may irritate or burn nose, throat and lungs.

Ingestion: Small amounts (tablespoonful) swallowed are not likely to cause injury; however, swallowing large amounts may irritate or bum digestive tract.

Medical Conditions Aggravated by Exposure: Pre-existing respiratory conditions.

This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC, or NTP.

This material meets the definition of an irritant as defined in OSHA's Hazard C ommunication Standard (29 CFR 1910.1200).

Potential Environmental Effects: Material in dry form is not hazardous to the environment. However, readily dissolves in water to form a weak acidic solution that is harmful to aquatic life.

SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	% (by weight)
Sodium bisulfate	7681-38-1	91.5 - 94.7
Sodium sulfate	7757-82-6	4.8 - 8.0
Moisture	7732-18-5	0.1 - 0.5

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SECTION 4 FIRST AID MEASURES

NOTE TO PHYSICIAN: Supportive care. Treatment based on judgment of the physician in response to reactions of the patient. May aggravate pre-existing respiratory conditions.

Eyes: Immediately flush eyes with water for at least 15 minutes, lifting eyelids to thoroughly flush. If redness or irritation persists, get prompt medical attention.

Skin: Immediately flush affected area with water for at least 15 minutes. If burn occurs, seek immediate medical attention.

Inhalation: Remove to fresh air. If irritation or discomfort persists, seek medical attention.

Ingestion: If large amounts are ingested (greater than tablespoonful), drink large quantities of milk or water. Follow with Milk of Magnesia, beaten eggs or vegetable oil. DO NOT induce vomiting. Contact Physician immediately.

SECTION 5 FIRE FIGHTING MEASURES

Extinguishing Media: Use extinguishing media appropriate for surrounding fire. Because material will readily dissolve in water to form a weak acid solution, avoid water contact with material if possible.

Hazardous Combustion Products: At temperatures over 8060 F (430 deg C), product will decompose generating oxides of sulfur.

Fire Fighting Instructions: Product readily dissolves in water to form a weak acid solution. If using water, wear acid protective equipment. No gases or toxic fumes are emitted from this reaction. However, if elevated temperatures (> 806 deg F) are reached, self-contained breathing apparatus should be worn.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use personal protection recommended in Section 8.

Land Spill: Vacuum or shovel material and place in disposal container. Avoid excessive dust generation. Dilute residual material with ample supply of water and direct to sanitary sewer if Federal, State or Local regulations permit.

Water Spill: Readily dissolves in water to form a weak acid solution. If water is isolated or can be contained, neutralize with weak alkaline

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solution.

Notify appropriate authorities if required by regulations.

SECTION 7 HANDLING AND STORAGE

Handling: Wear all recommended personal protective clothing when handling. Avoid contact with eyes. Wash thoroughly after handling. Minimize dust generation. Avoid breathing dust.

Storage: Material is hygroscopic and will readily absorb moisture. Keep containers tightly closed. DO NOT store where exposed to moist conditions. DO NOT store near strong alkalis.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines:
Sodium bisulfate - Not established.
Sodium sulfate - Not established.

Engineering Controls: Provide general and/or local exhaust ventilation to maintain airborne particulate below nuisance levels (>10 mg/m3).

Eye/Face Protection: Safety glasses or goggles.

Skin Protection: Rubber gloves and cotton-blend coveralls.

Respiratory Protection: In dusty atmospheres (>10 mg/m3), use a NIOSH-approved dust respirator.

General Hygiene Considerations: There are no known health hazards associated with this material when used as recommended. Follow good industrial hygiene practices including but not limited to: (1) avoid breathing dust; (2) avoid contact with eyes; and (3) wash thoroughly after handling.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Off-white granular material.
Odor: Fresh to Pungent
Physical State: Dry (Anhydrous) crystalline solid
pH: <1 @ 5% aqueous solution spherical shape beads
Solubility (in water): 1080 g/L @ 68 deg F (20 deg C)
Particle Size: 10.75 mm diameter
Flammability (solid): Material is non-combustible
Melting Point: 350 deg F (177 deg C)
Bulk Density: 80 - 85 lbs/ft3 (loose)
Molecular Formula: NaHSO4

PRODUCT: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL

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Molecular Weight: 120

SECTION 10 STABILITY AND REACTIVITY

Stability: Stable.

Conditions to Avoid: DO NOT store dry product where exposed to moist conditions.

Incompatible Materials: Avoid contact with strong alkaline material such as caustic. Dissolves readily in water to form a weak acid solution. DO NOT MIX with liquid chlorine bleach, ammonia cleansers or similar products.

Hazardous Decomposition Products: Only if heated over 806 deg F (430 deg C), at which sulfur dioxide and sulfur trioxide are formed.

Possibility of Hazardous Reactions: Will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

Reported Human Effects: No human data are available for this product.

Reported Animal Effects: Oral - LD50 (rat) 2800 mg/kg.

Skin irritation - This material is neither corrosive nor destructive to the skin of New Zealand rabbits. Occasionally, a very slight rash may appear.

SECTION 12 ECOLOGICAL INFORMATION

Ecotoxicity: This product readily dissolves in water to form a weak acid solution. A 0.05 percent or greater (by weight) solution of this product will likely be acutely harmful to aquatic life.

Chemical Fate Information: Material will decompose in soil. Studies show that there are no adverse effects of applying the main ingredient in this product (sodium bisulfate) directly to crops. In fact, there are existing products on the market that use sodium bisulfate as a soil additive to improve crop production. However, do not apply excessive quantities to soil.

SECTION 13 DISPOSAL CONSIDERATIONS

If this product as supplied becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA), 40 CFR Part 261. Dispose of in accordance with local, State and Federal laws and regulations.

SECTION 14 TRANSPORT INFORMATION

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Shipment in the United States of America (DOT): Not regulated.

Shipment by water (IMO): Not regulated. Shipment by air (ICAO & IATA): Not regulated.

Shipment in Canada (TDG): Not regulated. Surface Shipments in Europe: Not regulated.

SECTION 15 REGULATORY INFORMATION

TSCA: All chemical substances in this product are listed in U.S. TSCA Section 8(b) Inventory.

CERCLA (RQ): This product contains no Hazardous Substances listed in 40 CFR Part 302. SARA Title III: Section 311/312 Hazard Class - Acute. This product contains none of the substances subject to the reporting requirements of Section 313 (40 CFR Part 372).

California Proposition 65: This product does not contain any ingredient known to the State of California to cause cancer or reproductive toxicity as listed under the Safe Drinking Water and Toxic Enforcement Act of 1986.

New Jersey: Department of Health RTK List - sn 1704. Special Hazardous Substances - Corrosive Australia: List of Designated Hazardous Substances - Corrosive (R34), Harmful (R37)

Canada - WHMIS: Controlled Product Hazard Class D2B. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

Canada - CEPA: All components of this product are on the Domestic Substances List (DSL), and acceptable for use under the provisions of CEPA.

European Union (EU): Dangerous Substances (Annex I)
- EC No. 231-665-7
- Labels: Xi (irritant)
- Risk Phrases: R41
- Safety Phrases: S(2-)24-26

Germany: Water Classification (VwVwS) - Water Hazard Class: 1

Switzerland: Toxic Substance Classification - Giftklasse 3

Inventories: Australian Inventory of Chemical Substances; China; European Industry of Existing Commercial Chemical Substances (231-665-7); European Union Inventory of Cosmetic Ingredients, Other Ingredients; ICCA High Production Volume Working List; Japan Existing and New Chemical Substances

PRODUCT: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL

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(1-83, 1-491, 1-501); Korea Existing and Evaluated Chemical Substances (KE-31481); Philippines Inventory of Chemicals and Chemical Substances; OECD List of High Production Volume Chemicals.

SECTION 16 OTHER INFORMATION

HMIS Rating: Health - 1; Flammability - 0; Physical Hazard - 0

NFPA 704 Rating: Health - 1; Fire - 0; Reactivity - 0

(0 = minimal hazard, 1 = slight hazard, 2 = moderate hazard, 3 = severe hazard, 4 = extreme hazard)

---------- FOR ADDITIONAL INFORMATION ----------

CONTACT: MSDS COORDINATOR UNIVAR USA INC.
DURING BUSINESS HOURS, PACIFIC TIME (425)889-3400

07/06/05 07:16 PRODUCT: 344820 CUST NO: 113365 ORDER NO: 232929

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