PHOTOGRAPHERS' FORMULARY INC.

FORMULARY THIOUREA TONER BLEACH AND REDEVELOPMENT

To make 1 liter of bleach working solution and 1.8 liters of thiourea toning solution.

To obtain beautiful rich brown, sepia-like tones, the print is first bleached using a ferricyanide-bromide bath then redeveloped in a sulfide bath. In this process, the silver metal in the print is first converted to silver bromide then to brown silver sulfide. The resulting print can give the impression of a print made in the late 1800's.

The thiourea toner is actually a sulfide toner. In alkaline solution, thiourea (thiocarbamide) reacts to yield sulfide ions, the active ingredient in the toning bath. The advantage of this process is the avoidance of the foul smelling sodium sulfide bath.

The chemicals in this kit are used to prepare 1 liter of working bleach solution that can be reused. The chemicals for the toning solution are packaged so that only the desired amount of solution need be prepared for use in a single working session. A total of a little less than 2 liters of toning bath can be mixed with the chemicals contained in this kit

CHEMICALS CONTAINED IN THIS KIT

Chemical	Amount
Potassium Ferricyanide	50 g
Potassium Bromide	10 g
Sodium Carbonate, Monohydrate	20 g
Thiourea (Thiocarbamide)	5g
Sodium Hydroxide	10 g

CHEMICAL SAFETY

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

Sodium hydroxide, as a solid or in solution, is a dangerous chemical. It is corrosive and will cause a chemical burn. Its action is insidious because the bum occurs without pain. When working with sodium hydroxide, wash your hands frequently without using soap. If you detect a soapy feeling while washing, sodium hydroxide is present; in such a case wash thoroughly with soap and water.

The beads or pellets of solid sodium hydroxide can easily spill during solution preparation. If spillage occurs outside a sink, all of the spilled solid must be cleaned up. Use a damp sponge or paper towel. If the solid isn't cleaned up, it will absorb moisture from the air and form a puddle of very caustic hydroxide that will not disappear with time. Proper technique for preparing sodium hydroxide solutions is described in the Mixing section of these instructions. We strongly urge you to wear both safety glasses and rubber gloves when working with solid sodium hydroxide or its solutions.
Thiourea is neither toxic nor corrosive but, unfortunately, it is a potential carcinogen. Use rubber gloves when mixing or handling this compound or its solutions. Wash the work area, trays, and all mixing utensils with water followed by soap and water. Should a solution containing thiourea be spilled on the skin, wash immediately with water followed by soap and water.

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 the bleach bath in this toner does not call for tile use of acid.

Please consult with local sewer and water authorities regarding the 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 FOR A FULL REFUND.

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/m³	none estab.	5 mg CN/m³ (NaCN and KCN, Specifically)	none estab.	5 mg CN/m³	none estab.	5 mg CN/m³ (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†	
†Sec. 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

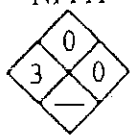
Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.
Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.
Skin Contact: Immediately flush skin with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

ORDER NO: 226085
PROD NO : 614395

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 IDENTIFICATION
****

PRODUCT NAME: POTASSIUM BROMIDE

MSDS NUMBER: P21725VS

DATE ISSUED: 11/19/02

SUPERCEDES: NEW

ISSUED BY: 006137

REVIEWED DATE: 07/16/2004
THIS MSDS HAS BEEN REVIEWED ON 07/16/2004, AND IS CURRENT AS OF THE DATE ISSUED ABOVE.

MATERIAL SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE & THE COMPANY

CHEMICAL NAME POTASSIUM BROMIDE
CHEMICAL FORMULA KBR
MOLECULAR WEIGHT 120.98

TYPE OF PRODUCT AND USE

PRODUCT: POTASSIUM BROMIDE

ORDER NO: 226085
PROD NO : 614395

FOR USE IN PHOTOGRAPHIC EMULSIONS AND DEVELOPING SOLUTIONS
HEAT STABILIZER IN NYLON
BROMINATING AGENT

COMPANY BROMINE COMPOUNDS LTD.
P.O.B 180, BEER SHEVA 84101, ISRAEL
TEL +972-8-6297830

SUPPLIER AMERIBROM, INC.
2115 LINWOOD AVENUE, FORT LEE, NEW JERSEY 07024-5004
USA TEL: 201 242 6560

EMERGENCY TELEPHONE CHEMTREC (800)424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPONENTS	WEIGHT %	ACGIH-TLV DATA	OSHA (PEL) DATA
POTASSIUM BROMIDE 7758-02-3	99.5	NOT DETERMINED	NOT DETERMINED

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW WHITE, ODOURLESS, CRYSTALLINE SOLID
IRRITANT TO EYES

POTENTIAL HEALTH EFFECTS:
- EYE CONTACT IRRITANT

- SKIN CONTACT NOT IRRITANT TO INTACT SKIN. SLIGHTLY IRRITANT ON PROLONGED CONTACT TO ABRADED SKIN.

- INHALATION MAY CAUSE IRRITATION TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
- INGESTION MAY CAUSE FALLING ASLEEP, MUSCULAR INCOORDINATION AND RESPIRATORY DEPRESSION.

ABDOMINAL PAIN, NAUSEA AND VOMITING.

4. FIRST-AID MEASURES

EYE CONTACT HOLDING THE EYELIDS APART, FLUSH EYES PROMPTLY WITH COPIOUS FLOWING WATER FOR AT LEAST 20 MINUTES.

GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT REMOVE CONTAMINATED CLOTHING. WASH SKIN THOROUGHLY WITH MILD SOAP AND PLENTY OF WATER FOR AT LEAST 15 MINUTES. WASH CLOTHING BEFORE RE-USE.

GET MEDICAL ATTENTION IF IRRITATION OCCURS.

INHALATION IN CASE OF DUST INHALATION OR BREATHING FUMES RELEASED FROM HEATED MATERIAL, REMOVE PERSON TO FRESH AIR.

KEEP HIM QUIET AND WARM. APPLY ARTIFICIAL RESPIRATION IF NECESSARY AND GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION IF SWALLOWED, WASH MOUTH THOROUGHLY WITH PLENTY OF WATER AND GIVE WATER TO DRINK.

GET MEDICAL ATTENTION IMMEDIATELY.

NOTE: NEVER GIVE AN UNCONSCIOUS PERSON ANYTHING TO DRINK.

NOTES TO THE PHYSICIAN IN CASE OF INGESTION INDUCE VOMITING IN ALERT PATIENT. NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

5 FIRE-FIGHTING MEASURES

FLASH POINT NONE
FLAMMABLE/EXPLOSION LIMITS NOT FLAMMABLE
AUTO-IGNITION TEMPERATURE NOT APPLICABLE
SUITABLE EXTINGUISHING MEDIA MATERIAL IS NOT COMBUSTIBLE. USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS.

FIRE FIGHTING PROCEDURE
COOL CONTAINERS WITH WATER SPRAY. IN CLOSED STORES, PROVIDE FIRE-FIGHTERS WITH SELF-CONTAINED BREATHING APPARATUS IN POSITIVE PRESSURE MODE.

UNUSUAL FIRE AND EXPLOSION
HAZARDS WILL DECOMPOSE FROM CA. 800 C RELEASING POISONOUS AND CORROSIVE FUMES OF HBR.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS WEAR RESPIRATOR, CHEMICAL SAFETY GOGGLES, RUBBER GLOVES AND BOOTS.

METHODS FOR CLEANING UP SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL OR POSSIBLE RE-USE.

AVOID RAISING DUST.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

7. HANDLING AND STORAGE

HANDLING AVOID BODILY CONTACT.
KEEP CONTAINERS TIGHTLY CLOSED.
STORAGE HYGROSCOPIC. AVOID EXPOSURE TO MOISTURE.
STORE IN A DRY, COOL, WELL-VENTILATED AREA AWAY FROM INCOMPATIBLE MATERIALS (SEE "MATERIALS TO AVOID").

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION REQUIREMENTS MECHANICAL EXHAUST REQUIRED.
VENTILATION MUST BE SUFFICIENT TO MAINTAIN TLV-TWA BELOW 10 MG/M3 (ACGIH RECOMMENDATION FOR PARTICULATES (INSOLUBLE) NOT OTHERWISE SPECIFIED (PNOS)).

PERSONAL PROTECTIVE EQUIPMENT:
- RESPIRATORY PROTECTION DUST RESPIRATOR
HAND PROTECTION PVC GLOVES RUBBER GLOVES
- EYE PROTECTION CHEMICAL SAFETY GOGGLES
- SKIN AND BODY PROTECTION BODY COVERING CLOTHES AND BOOTS
HYGIENE MEASURES SAFETY SHOWER AND EYE BATH SHOULD BE PROVIDED. DO NOT EAT, DRINK OR SMOKE UNTIL AFTER-WORK SHOWERING AND CHANGING CLOTHES.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE	WHITE, ODOURLESS, CRYSTALLINE SOLID
MELTING POINT/RANGE	734 C
BOILING POINT/RANGE	1435 C
VAPOUR PRESSURE	1 MM HG AT 795 C
VAPOR DENSITY	NOT APPLICABLE UNDER STANDARD CONDITIONS
EVAPORATION RATE (ETHER=1)	NOT APPLICABLE UNDER STANDARD CONDITIONS

SOLUBILITY:
- SOLUBILITY IN WATER 65.5 G/100ML AT 20 C
102 GR/100ML AT 100 C
- SOLUBILITY IN OTHER SOLVENTS ALCOHOL: 0.142 G/1 00G AT 25 C
SPECIFIC GRAVITY 2.75
DECOMPOSITION TEMPERATURE FROM CA. 800 C

10. STABILITY AND REACTIVITY

STABILITY HYGROSCOPIC.
STABLE UNDER NORMAL CONDITIONS
MATERIALS TO AVOID STRONG OXIDANTS
STRONG ACIDS
HEAVY METAL SALTS
REACTS EXPLOSIVELY WITH BROMINE TRIFLUORIDE
CONDITIONS TO AVOID EXPOSURE TO MOISTURE
HEATING ABOVE DECOMPOSITION TEMPERATURE

HAZARDOUS DECOMPOSITION
PRODUCTS HBR
HAZARDOUS POLYMERIZATION WILL NOT OCCUR

11. TOXICOLOGICAL INFORMATION

ACUTE TOXICITY:
- RAT ORAL LD50 > 5000 MG/KG
- EYE IRRITATION (RABBIT) IRRITANT
- DERMAL IRRITATION (RABBIT) NOT IRRITANT

CHRONIC TOXICITY REPEATED SKIN CONTACT MAY CAUSE DERMATITIS.
REPEATED ORAL INTAKE OF BROMIDES (>9 MG/KG BODY WEIGHT/DAY) MAY AFFECT THE CENTRAL NERVOUS SYSTEM. WARNING SYMPTOMS INCLUDE MENTAL DULLNESS, SLURRED SPEECH, WEAKENED MEMORY, APATHY, ANOREXIA, CONSTIPATION, DROWSINESS AND LOSS OF SENSITIVITY TO TOUCH AND PAIN.

MUTAGENICITY NOT MUTAGENIC BY THE AMES TEST

CARCINOGENICITY NOT KNOWN TO BE A CARCINOGEN.
NOT CLASSIFIED BY IARC.
NOT INCLUDED IN NTP 9TH REPORT ON CARCINOGENS.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE KBR IS AN INORGANIC SALT, WHICH FULLY DISSOCIATES IN AQUATIC ENVIRONMENT TO BROMIDE AND POTASSIUM IONS. IT ALSO UNDERGOES DEGRADATION IN SOIL TO BROMIDE ION (NO FURTHER DEGRADATION OR BIODEGRADATION WILL OCCUR).

AQUATIC TOXICITY
- LC50, FISH 3200 MG/L, 5 DAYS (RAINBOW TROUT)
-48 HOUR-EC50, DAPHNIA MAGNA >100 MG/I

AVIAN TOXICITY:
- ORAL LD50, BOBWHITE QUAIL >2500 MG/KG
- DIETARY LC50, BOBWHITE QUAIL 6000 PPM

BIOACCUMULATIVE POTENTIAL BIOACCUMULATION IS NOT LIKELY TO OCCUR SINCE THIS MATERIAL IS HIGHLY SOLUBLE IN WATER.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL ADD INTO A LARGE VESSEL CONTAINING WATER AND DRAIN INTO SEWER WITH AMPLE WATER. OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS WHEN DISPOSING OF THIS MATERIAL.

PRODUCT: POTASSIUM BROMIDE

ORDER NO: 226085
PROD NO : 614395

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14. TRANSPORTATION INFORMATION

DOT NOT REGULATED
IMO NOT REGULATED
ICAO/IATA NOT REGULATED

15. REGULATORY INFORMATION

USA REPORTED IN THE EPA TSCA INVENTORY

CANADA LISTED IN DSL

EEC NO. 231-830-3
JAPAN LISTED IN MITI (1-108)

AUSTRALIA LISTED IN AICS

CHINA INVENTORY LISTED

SOUTH KOREA LISTED IN ECL (KE-29079)

SWITZERLAND GIFTKLASSE 3
PHILIPPINES LISTED IN PICCS

16. OTHER INFORMATION

THIS DATA SHEET CONTAINS CHANGES FROM THE PREVIOUS VERSION IN SECTION(S) 8,15

THE HSE POLICY OF DEAD SEA BROMINE GROUP
DEAD SEA BROMINE GROUP (DSBG) IS THE WORLD'S LARGEST PRODUCER OF ELEMENTAL BROMINE AND A RECOGNIZED LEADER IN THE DEVELOPMENT AND SUPPLY OF BROMINE COMPOUNDS.
DSBG IS COMMITTED TO RESPONSIBLY MANAGE ITS PRODUCTS AT ALL STAGES OF THEIR LIFE CYCLE IN ORDER TO PROTECT HUMAN HEALTH AND THE ENVIRONMENT.
THIS RESPONSIBILITY APPLIES THROUGHOUT DEVELOPMENT, MANUFACTURE, TRANSPORTATION, USE, RECYCLE AND DISPOSAL OF DSBG PRODUCTS.

WITHIN THIS FRAMEWORK DSBG IS COMMITTED TO:
* COMPLY WITH NATIONAL AND INTERNATIONAL REGULATORY REQUIREMENTS
* CONFORM TO THE ISO 14001 AND OHSAS 18001 REQUIREMENTS FOR ENVIRONMENTAL AND OCCUPATIONAL HEALTH &SAFETY MANAGEMENT SYSTEMS AND PERIODICALLY EVALUATE PERFORMANCE AS PART OF THE COMPANY'S EXISTING QUALITY AUDITS SYSTEM
* DESIGN PRODUCTS AND PROCESSES WHICH PREVENT RISK TO HEALTH AND THE ENVIRONMENT AT PRODUCTION SITES AND ALONG THE SUPPLY CHAIN
* IMPROVE EFFICIENCY IN USE OF ENERGY & NATURAL RESOURCES, PROMOTE RECYCLING AND WASTE MANAGEMENT THROUGH SAFE & ENVIRONMENTALLY SOUND END OF LIFE

PROGRAMS

* WORK FOR CONTINUAL IMPROVEMENT IN HSE PERFORMANCE
* REGULARLY ASSESS AND RESPONSIBLY MANAGE HEALTH, SAFETY AND ENVIRONMENTAL RISKS ASSOCIATED WITH PRODUCTS AND PROCESSES
* EDUCATE AND TRAIN ALL MANAGERS AND EMPLOYEES TO IMPROVE THEIR HSE PERFORMANCE
* DISTRIBUTE UPDATED INFORMATION CONCERNING ITS POLICY AND PRODUCTS TO ITS WORKERS, CUSTOMERS AND OTHER INTERESTED PARTIES THROUGH MATERIAL SAFETY DATA SHEET (MSDS), WORKERS' SAFETY SHEETS AND THROUGH THE DSBG INTERNET SITE
* DEVELOP BUSINESS RELATIONSHIPS WITH RESPONSIBLE SUPPLIERS, TRANSPORTERS AND DISTRIBUTORS AND PROVIDE THEM WITH HSE SUPPORT, INFORMATION AND TRAINING
* SUPPORT PRODUCT STEWARDSHIP PROGRAMS IN COOPERATION WITH CUSTOMERS, DISTRIBUTORS AND TRANSPORTERS
* ALLOCATE THE NECESSARY RESOURCES FOR IMPLEMENTATION OF THIS POLICY

PREPARED BY HSE DIVISION IN ISRAEL
TELEPHONE: +/972-8-6297830
TELEFAX: +/972-8-6297832
WWW.DSBG.COM
END OF SAFETY DATA SHEET

PRODUCT: POTASSIUM BROMIDE

ORDER NO: 226085
PROD NO : 614395

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

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

10/28/04 08:52 PRODUCT: 614395 CUST NO: 113365 ORDER NO: 226085

---------- NOTICE ----------

******** UNIVAR USA INC("UNIVAR"), EXPRESSLY DISCLAIMS

ALL EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A

PARTICULAR PURPOSE, WITH RESPECT TO THE PRODUCT OR INFORMATION PROVIDED

HEREIN, AND SHALL UNDER NO CIRCUMSTANCES BE LIABLE FOR INCIDENTAL OR

CONSEQUENTIAL DAMGAGES. **

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* * * E N D O F M S D S * * *

10-1190

MATERIAL SAFETY DATA SHEET

SODIUM CARBONATE MONOHYDRATE

1. Product Identification

Synonyms: Carbonic acid, disodium salt monohydrate; disodium carbonate monohydrate; Soda ash
CAS No.: 5968-11-6 (Anhydrous) 5968-11-6 (Monohydrate)
Molecular Weight: 124.00
Chemical Formula: $Na_2CO_3.H_2O$
Product Codes: CANTON LABORATORIES : 47040, 67160, 57042

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Carbonate	5968-11-6	99.5-100.5%	No

3. Hazards Identification

Emergency Overview

DANGER! MAY CAUSE EYE BURNS. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Inhalation of dust may cause irritation to the respiratory tract. Symptoms from excessive inhalation of dust may include coughing and difficult breathing. Excessive contact is known to cause damage to the nasal septum.
Ingestion:
Sodium carbonate is only slightly toxic, but large doses may be corrosive to the

gastro-intestinal tract where symptoms may include severe abdominal pain, vomiting, diarrhea, collapse and death.

Skin Contact:
Excessive contact may cause irritation with blistering and redness. Solutions may cause severe irritation or burns.
Eye Contact:
Contact may be corrosive to eyes and cause conjuctival edema and corneal destruction. Risk of serious injury increases if eyes are kept tightly closed. Other symptoms may appear from absorption of sodium carbonate into the bloodstream via the eyes.
Chronic Exposure:
Prolonged or repeated skin exposure may cause sensitization.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of soap and 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.

Note to Physician:
Consider endoscopy in all suspected cases of sodium carbonate poisoning. Perform blood analysis to determine if dehydration, acidosis, or other electrolyte imbalances occurred.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered an explosion hazard, but sodium carbonate may explode when applied to red-hot aluminum.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
Use protective clothing and breathing equipment appropriate for the surrounding fire.

6. Accidental Release Measures

Ventilate 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.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. 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.

8. 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, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. 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 protective gloves and clean body-covering clothing.
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.

9. Physical and Chemical Properties

Appearance:
White crystalline powder.
Odor:
Odorless.
Solubility:
30 g/100 ml water @ 60C (140F)
Density:

2.25
pH:
Aqueous solutions are strongly alkaline.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
400C (752F)
Melting Point:
851C (1564F) Loses water at ca. 100C.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Oxides of carbon and sodium oxide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Fluorine, aluminum, phosphorous pentoxide, sulfuric acid, zinc, lithium, moisture, calcium hydroxide and 2,4,6-trinitrotoluene. Reacts violently with acids to form carbon dioxide.
Conditions to Avoid:
Moisture, heat, dusting and incompatibles.

11. Toxicological Information

For anhydrous sodium carbonate: Oral rat LD50: 4090 mg/kg; inhalation rat LC50: 2300 mg/m3/2H; irritation eye rabbit: 50 mg severe; investigated as a mutagen, reproductive effector.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Carbonate (5968-11-6)	No	No	None

12. 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.

13. Transport Information

Not regulated.

14. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Sodium Carbonate (5968-11-6)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Carbonate (5968-11-6)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Carbonate (5968-11-6)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Carbonate (5968-11-6)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Poison Schedule: S5
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.

15. Other Information

NFPA Ratings: Health: 2 Flammability: 0 Reactivity: 0
Label Hazard Warning:
DANGER! MAY CAUSE EYE BURNS. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.
Label Precautions:
Do not get in eyes.
Avoid breathing dust.
Keep container closed.
Use 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 while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large

quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Prepared by: CANTON LABORATORIES

Phone Number: (+91) 265 643119/638001 (INDIA)

10-1470 10/30/02

RODUCT: THIOUREA

ORDER NO:
PROD NO :

NIVAR USA INC. (425)889-3400
100 CARILLON POINT , KIRKLAND , WA 98033

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

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

****
PRODUCT IDENTIFICATION
****

RODUCT NAME: THIOUREA

SDS NUMBER: P1146JVS

ATE ISSUED: 08/30/01

UPERCEDES: NEW

SSUED BY: 003350

MATERIAL SAFETY DATA SHEET

EGUSSA Corp./CREANOVA Inc.
ine Chemicals Division
4 Hour Emergency Number: 800-424-9300
4 Hour CHEMTREC Number: 800-424-9300

. PRODUCT AND COMPANY IDENTIFICATION
roduct Name THIOUREA
roduct Use/Class: Industrial use

upplier/Manufacturer:

JCT: THIOUREA

ORDER NO:
PROD NO :

SA Corp./CREANOVA Inc.
Interpace Parkway
ling C
Box 677
ppany, NJ 07054-0677
ct Regulatory Services, Information Number: 973-541-8060

MPOSITION/INFORMATION ON INGREDIENTS
dous Ingredients

	CAS Number	% (Wt./Wt.)
mide, thio-	000062-56-6	100

See Section 8 for Exposure Guidelines
Regulatory Status::
This material is classified as hazardous under OSHA regulations.

ZARDS IDENTIFICATION
ENCY OVERVIEW
ause allergic skin reaction. Dust may form explosive mixtures with
May cause eye, skin and respiratory tract irritation. May be harmful
allowed. May cause long-term adverse effects in the aquatic
onment. May be a fetotoxin.

TIAL HEALTH EFFECTS
ontact:
Possibly irritating.
Contact:
Possibly irritating. May cause skin sensitization, an allergic reaction,
which becomes evident on re-exposure to this material.
ation:
Possibly irritating.
tion:
May cause gastrointestinal irritation, nausea, vomiting, and diarrhea.
al:
Possible risk of harm to the unborn child.

RST AID MEASURES
AID
ontact:
In case of contact, immediately flush eyes with plenty of water for at
least 15 minutes or until all material has been removed. Obtain medical
attention.
Contact:
Flush skin with plenty of water. Remove contaminated clothing. Obtain
medical attention if irritation develops or persists.
ation:
If inhaled, remove to fresh air. If breathing is difficult, give
oxygen. If unconscious, evaluate the need for artificial respiration.

Get immediate medical attention.

ngestion:

If swallowed give two glasses of water and induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

. FIRE FIGHTING MEASURES

lash Point: Not Determined

lash Point Method: Not determined

ower Explosive Limit: Not determined

pper Explosive Limit: Not determined

SHA Flammability Classification: None

utoignition Temperature: Not Determined

ther Flammable Properties:

Burning will produce hazardous compounds including oxides of: carbon, nitrogen, sulfur.

xtinguishing Media:

Use water spray or fog, foam, dry chemical or CO2. Solid stream of water may spread the fire.

ire Fighting Procedures:

Containers can build up pressure if exposed to heat (fire). Cool with water spray. As in any fire, wear self-contained, pressure-demand breathing apparatus (MSHA-NIOSH approved or equivalent) and full protective gear.

. ACCIDENTAL RELEASE MEASURES

teps To Be Taken In Case Material Is Released Or Spilled:

Collect material and place in a disposal container. Obey relevant local, state, provincial and federal laws and regulations. Do not contaminate any lakes, streams, ponds, groundwater or soil. Use personal protective equipment as described in Section 8.

. HANDLING AND STORAGE

andling:

Use with adequate ventilation. Minimize dust generation and accumulation.

torage:

Store in a cool, dry place. Keep container closed when not in use. Recommended container materials: Polyethylene.

. EXPOSURE CONTROLS/PERSONAL PROTECTION

xposure Limits

	Value	Limit	Reference
arbamide, thio-	N.E.	TWA	OSHA/ACGIH
	N.E.	STEL	OSHA/ACGIH

JCT: THIOUREA

ORDER NO:
PROD NO :

---

neering Controls:
Use adequate ventilation.
iratory Protection:
A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 or applicable federal/provincial requirements must be followed whenever workplace conditions warrant respirator use. NIOSH's "Respirator Decision Logic" may be useful in determining the suitability of various types of respirators.
Protection:
Wear safety glasses with side shields.
Protection:
Use impermeable gloves.
Protective Equipment:
To identify additional Personal Protective Equipment (PPE) requirements, it is recommended that a hazard assessment in accordance with the OSHA PPE Standard (29CFR1910.132) be conducted before using this product.

YSICAL AND CHEMICAL PROPERTIES
Pressure Not available
Density (Air = 1) Not applicable
ific Gravity Not applicable
ing Point Not available
ing Point 171-184 C
Not available
Density 640 kg/m3
oration Rate Not applicable
oility In Water 137 g/L
Properties:
a. Solid. Odorless.

STABILITY AND REACTIVITY
ility:
This product is stable under normal storage conditions.
zdous Polymerization:
Will not occur under normal conditions.
itions To Avoid:
Operations that create dust. Avoid high temperatures and sources of ignition. Temperature >140 C.
patibility With Other Materials:
Strong acids. Strong bases. Strong oxidizers.
zdous Decomposition Products:
Sulfur oxides.

TOXICOLOGICAL INFORMATION
uct Toxicological Information:
LD50 (rat): 1,750 mg/kg
al LD50 (rabbit)2,800 mg/kg

---

upplementary Information:
This product may be fetotoxic. This product is listed by NTP and IARC as an animal carcinogen. May cause sensitization.

2. ECOLOGICAL INFORMATION
quatic Toxicity Data
C50 (Fish) : 10,000 mg/L (Brachydanio rerio-96 h)
C10 (Bacteria): 1,245 mg/L (Pseudomonas putida)
C50 (Daphnia) : 110 mg/L (24 hr)
C50 (Algae) : 6.8 mg/L (Scenedesmus subspicatus)

upplementary Information:
This product is not easily biodegradable.

3. DISPOSAL CONSIDERATIONS
isposal Method:
Waste must be disposed of in accordance with federal, state and local regulations. Incineration is the preferred method.

4. TRANSPORT INFORMATION
.S. DOT Transport Information
roper Shipping Name: Environmentally Hazardous Substance, Solid, N.O.S.
echnical Name: (Thiourea)

azard Class: 9 Packing Group: III
RQ (lbs.): 10

.D. Number: UN3077 ERG No.: 171 Hazard Subclasses: None
ransport Label(s) Required: Class 9

5. REGULATORY INFORMATION
his product contains the following non-hazardous components:
No non-hazardous components exist

.S. Federal Regulations
SHA:
This document has been prepared in accordance with the MSDS requirements of the OSHA Hazard Communication Standard.
lean Air Act Section 112:
This product contains the following components present at or above the OSHA de minimus level and listed as Hazardous Air Pollutants:
None
This product contains the following components present at or above the OSHA de minimus level and listed as Extremely Hazardous Air Pollutants:
None
ARA Section 302:
This product contains the following components listed as Extremely

ICT: THIOUREA

ORDER NO:
PROD NO :

Hazardous Substances:
None
Section 311/312:
Hazard Classifications: Immediate (acute), Delayed (chronic)
Section 313:
This product contains the following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

	CAS Number	Wt. %
mide, thio-	000062-56-6	100

This product or its components are listed in or exempt from the TSCA inventory requirements.
This product contains the following non-proprietary substances subject to export notification under Section 12(b) of TSCA:
None

Regulations
lersey:
This product contains the following non-hazardous components subject to disclosure under New Jersey Right-To-Know legislation:
None
ylvania:
This product contains the following non-hazardous components subject to disclosure under Pennsylvania Right-To-Know legislation:
None
'ornia (Proposition 65):
This product contains the following substances known to the State of California to cause cancer:

	CAS Number	Wt. %
ng: Contains Carbamide, thio-	000062-56-6	100

This product contains the following substances known to the State of California to cause adverse reproductive effects:
None

national Regulations
Summary of International Chemical Inventory Status

Canada	On inventory
Europe	On inventory
South Korea	On inventory
Australia	On inventory

THER INFORMATION
Ratings: Health - 2* Flammability - N Reactivity - 1
gs Key: 4 = Highest hazard, 0 = Lowest hazard,
* = Chronic health hazard, N = No rating for powders

RODUCT: THIOUREA

ORDER NO:
PROD NO :

FPA Ratings: Health - 2 Flammability - N Reactivity - 1
atings Key: 4 = Highest hazard, 0 = Lowest hazard, N = No rating for powders

ey to abbreviations used:
A Not applicable
AV Not available
E Not established
JTSR No. New Jersey Trade Secret Registry Number
R) Registered Trademark.
M Trademark.

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

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

10/24/02 12:42 PRODUCT: CUST NO: ORDER NO:

---------- NOTICE ----------

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CT: THIOUREA

ORDER NO:
PROD NO :

ESPONSIBLE TO VERIFY THIS DATA UNDER THEIR OWN OPERATING CONDITIONS TO
MINE WHETHER THE PRODUCT IS SUITABLE FOR THEIR PARTICULAR PURPOSES AND THEY
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SS.

*** E N D O F M S D S ***

10-9-20

MATERIAL SAFETY DATA SHEET NUMBER 011

Solvay Minerals, Inc., Green River, WY.
Date: June 26, 2003
Supersedes edition: 04/09/03
Purpose of revision: Phone numbers, Sections 11.2, 12.1, 15.7
Issued by: P J Luzmoor, Safety/Training Dept.

HAZARDOUS MATERIAL INFORMATION SYSTEM(HMIS®) H = 3 F = 0 R = 1 PERSONAL PROTECTION = J

The following information is based upon our current knowledge and experience of our product and is not exhaustive. It applies to the product as defined by the specifications. In case of combinations of mixtures, one must confirm that no new hazards are likely to exist. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and integrity of the work environment. (Unless noted to the contrary, the technical information applies only to pure product).

MANUFACTURER/IMPORTER: Solvay Minerals, Inc., PO BOX 27328-Houston, TX. 77227-7328 Phone: 800-443-2785
Visit us on the WEB @ www.solvayminerals.com
Telephone #-Emergencies (USA): 1-307-872-6688 (Solvay Minerals, Green River, WY.)
Telephone #-Emergencies (USA): 1-800-424-9300 (CHEMTREC)
Telephone #-Emergencies (INTERNATIONAL/MARITIME): 1-703-527-3887 (CHEMTREC)
Telephone #-Emergencies (CANADA): 1-613-996-6666 (CANUTEC)
Telephone #-Emergencies (MEXICO): 01-800-00-214-00(Mex. Republic)-0-11-525-559-1588 (Elsewhere)

1. PRODUCT IDENTIFICATION

1.1 Product Name: CAUSTIC SODA-ANHYDROUS
1.2 Chemical Name: Sodium hydroxide.
1.3 Synonyms: Caustic soda (beads-flakes-pearls-micropearls) sodium hydrate
1.4 Trade Names: Caustic soda, sodium hydroxide-solid.
1.5 Recommended uses: Pulp and paper, aluminum, petroleum refining, chemicals, metal cleaning, food preparation, etching and electroplating, laundering and bleaching
1.6 Formula: NaOH
1.7 Molecular Weight: 40.01
1.8 CAS No.: 1310-73-2
1.9 EINECS #: 215-185-5

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENTS/FORMULA	CAS #	UN #	PERCENT
Sodium Hydroxide-NaOH	1310-73-2	1823	>98.00%

Responsible Care®
Good Chemistry at Work

Solvay Minerals

SOLVAY

3. HAZARD IDENTIFICATION

3.1 Sodium hydroxide-solid is a white, crystalline, translucent corrosive material. Causes severe eye and skin burns. Reacts with moisture to release heat and reacts with metals to release hydrogen.

3.2 **Route(s) of Entry:** Inhalation-Yes Skin-Yes Ingestion-Yes

3.3 **Effects of exposure:** Corrosive. Causes severe eye and skin burns. Eye, skin, and respiratory tract irritant.

Inhalation: Inhalation of mists and dusts cause burns of the nasal passage, severe irritation of the respiratory tract and gastrointestinal tract damage. May cause pulmonary edema.

Eyes: Intense irritation and burns to the eyes and eyelids. Potential loss of sight.

Skin: Intense irritation and burns, reddening and swelling to the skin. Deep ulcerations, difficult to heal. Upon contact with product in solution, the skin becomes "soapy" to the touch.

Ingestion: Intense irritation and burns to the mouth, throat, esophagus and stomach. Ingestion of concentrated solutions has caused death in animals and humans. (Gosselin, Smith, and Hodge, 1984; PB 234-899, 1984).

4. FIRST AID MEASURES

4.1 *Inhalation:* Remove individual from area of exposure to fresh air, support breathing as necessary. Seek **immediate** medical attention.

Eyes: **Immediately** flush eyes and surrounding area for at least 15 minutes, using large amounts of water. Lift eyelids to insure the flushing of entire eye surface and the underside of eyelids. Seek **immediate** medical attention.

Skin: **Immediately** direct individual under a shower. Remove contaminated clothing including footwear. Wash affected skin with water until "soapy" feel is gone. Continue irrigation and seek **immediate** medical attention if contact is extended or with a hot solution.

Ingestion: IN ALL CASES, CALL A PHYSICIAN **IMMEDIATELY**. REQUEST AMBULANCE TRANSPORT TO NEAREST HOSPITAL. Do not attempt to give anything by mouth. Treat for shock.

4.2 **Medical Conditions Aggravated by Exposure:** Skin and lung disorders may be affected adversely by sodium hydroxide; an individual's specific medical condition and type of exposure determine the likelihood of an adverse effect.

5. FIRE FIGHTING MEASURES

5.1 **Flash Point:** Non combustible. *Method:* Not applicable.

5.2 **Auto ignition Temperature:** Not applicable.

5.3 **Flammability Limits:** *Lower & Upper Limit:* Non flammable.

5.4 **Unusual Fire and Explosion Hazards:** Causes exothermic reaction on contact with water. Formation of flammable gas on contact with certain metals

5.5 **Common Extinguishing Methods:** Not applicable.

5.6 **Fire Fighting Procedures:** Extinguish fire using agent suitable for surrounding fire. Use water spray to keep containers cool. Keep water away from direct contact with material.

6. ACCIDENTAL RELEASE MEASURES

6.1 **Spills:** Wear proper protective clothing (see section 8). Keep water away from the area of release. Stop or control the spill without undue risk to personnel. Prompt cleanup and removal are necessary. In case of rain, protect product with the aid of a plastic sheet to avoid the run-off of solution into the sewer. Shovel material into a suitable dry container. Isolate discharged material for disposal in accordance with applicable federal, state, and local environmental laws and regulations.

7. HANDLING AND STORAGE

7.1 **Handling:** Avoid contact with the skin, eyes, or clothing. DO NOT WEAR CONTACT LENSES, EVEN WITH PROPER EYE PROTECTION, WHEN HANDLING THIS PRODUCT. Use adequate ventilation and use NIOSH/MSHA approved full-face respiratory protection when exposure to excessive dust is possible. Wash exposed areas immediately and thoroughly after skin contact from working with this product and before eating, drinking, using tobacco products or using the rest room. The effects of exposure can cause burns that are not immediately painful or visible.

7.2 **Storage:** Keep in a closed, properly labeled container in a well ventilated, dry area away from acids, water, oxidizing materials, and metals (tin, aluminum, and zinc). Protect from physical damage.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 **Exposure Limits:** ACGIH 2002-2003 ceiling=2 mg/m^3, OSHA PEL ceiling=2 mg/m^3.

8.2 **Ventilation:** Effective ventilation should be provided to meet established exposure limits. Local exhaust ventilation advised when working with solution or when excessive mists are present.

8.3 **Respiratory Protection:** Wear full-face respirators approved by NIOSH/MSHA if dusts are expected or exceed established exposure limits.

8.4 **Protective Gloves:** Wear chemical resistant gloves such as natural or butyl rubber, neoprene, or PVC.

8.5 **Eye Protection:** Wear chemical safety goggles and chemical face shield. DO NOT WEAR CONTACT LENSES, EVEN WITH EYE PROTECTION.

8.6 **Other Protective Clothing or Equipment:** Wear rubber or vinyl impervious boots, pants, coat, or apron with long sleeves, and other protective clothing suitable for use conditions to prevent contact with skin or eyes. An eyewash and safety shower should be nearby and ready for use. Use good hygiene practices when handling this product including changing work clothes after use. Do not eat, drink or smoke in areas where this material is handled.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 **Appearance:** solid, crystalline, corrosive material. **Color:** translucent. **Odor:** Odorless.
9.2 **Melting Point:** 318 ° C (604° F).
9.3 **Boiling Point:** 1390 ° C (2534° F).
9.4 **Specific Gravity** (H_2O=1): 2.13 @ 15.5° C (60° F).
9.5 **Vapor Density** (air=1): Not applicable.
9.6 **Vapor Pressure:** 1.5 mm HG, 0.2 kPa @ 20° C (68°F).
9.7 **Coefficient of Water/Oil Distribution:** Not applicable
9.8 **Percent volatile (by volume):** Not applicable
9.9 **Solubility:** Completely soluble in water (50% solution @ >10° C (50° F) accompanied by a significant release of heat).
9.10 **Decomposition Temperature:** Not available.
9.11 **Viscosity:** 50 cps @ 36°C (97° F) for a 50% solution.
9.12 **pH:** 14.0 (5% solution).
9.13 **Evaporation Rate:** Not Applicable.
9.14 **Bulk Density:** .5-.75 kg/dm^3

10. STABILITY AND REACTIVITY

10.1 **Stability:** Slightly reactive.
10.2 **Hazardous Decomposition Products:** None.
10.3 **Conditions to Avoid:** Strong alkali. When in contact with water, may generate sufficient heat (with splattering) to ignite combustible materials. When moist, reacts with some metals producing hydrogen, a flammable gas.
10.4 **Materials and Substances to Avoid:** Contact with acids, flammable liquids, organic halogen compounds, nitro compounds, and amphoteric metals, such as aluminum, magnesium, and zinc.

11. TOXICOLOGICAL INFORMATION

11.1 **Acute toxicity:** LD_{50}-oral: 400 mg/kg species: rabbit
11.2 **Chronic toxicity:** Inhalation, acute and repeated exposure, rat, target organ: respiratory system, corrosive effect. Oral route, after repeated exposure, rat, target organ: gastro-intestinal system, corrosive effect. In vitro, no mutagenic effect. Prolonged exposure to high concentrations can cause ulceration of nasal passages and lung irritation.

12. ECOLOGICAL INFORMATION

12.1 **Acute Ecotoxicity:** Fishes, Gambusia affinis, LC_{50}, 96h, 125 mg/l @ pH>10. Crustaceans, Ceriopaphnia, EC_{80}, 48h, 40 mg/l @ pH>10.

13. DISPOSAL CONSIDERATIONS

13.1 **Waste treatment:** If considered a waste, Caustic Soda may be a characteristic hazardous waste under 40 CFR 261. All residual Sodium Hydroxide-solid should be removed from any container prior to disposal. It is recommended that Sodium Hydroxide-solid waste is disposed of in an EPA approved disposal facility in accordance with applicable environmental laws and regulations.

13.2 **RCRA waste #:** 40 CFR 261.22, characteristic of corrosivity (D002)-see section 13.1.

14. TRANSPORT INFORMATION

14.1 **UN #:** 1823

14.2 **TDG class:** 8 **TDG packing group.:** II
TDG subsidiary class (es): (9.2) **RL for division 9.2:** 50 Kg.

14.3 **DOT ERG guide #:** 154

14.4 **Hazard class: IMO:** 8 **DOT:** 8(Corrosive).

14.5 **Proper shipping name: TDG,IMO,DOT:** Sodium hydroxide, solid,

14.6 **STCC #:** 4935240

15. REGULATORY INFORMATION

15.1 **NFPA:** *Health-3 Flammability–0 Reactivity–1 Special-None*
HMIS: *Health - 3 Fire-0 Reactivity-1 Personal Protection-J-*
WHMIS: Class E-CORROSIVE. This product has been classified in accordance with the hazard criteria of the ***Controlled Products Regulations*** and the MSDS contains all the information required by the ***Controlled Products Regulations.***

15.2 **Regulatory/Carcinogenicity Status:** NTP (1987), IARC: (1990), OSHA: (1987), None.

15.3 **CERCLA reportable quantity:** 1000 pounds (454 KG).

15.4 **SARA Listing:** Yes. Sodium hydroxide-solid - CAS 1310-73-2

15.5 **Canadian DSL Registration:** Yes

15.6 **TSCA Inventory:** Yes.

15.7 **EEC Labeling:** Name of dangerous products-sodium hydroxide.
Labeling following Directive 1999/45/EC:

Symbols	C	Corrosive
Phrases R	35	Causes severe burns
Phrases S	(1/2)	Keep locked up and out of reach of children
	26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
	37/39	Wear suitable gloves and eye/face protection.
	45	In case of accident or if you feel unwell, seek medical advice immediately

(show label where possible).

16. OTHER INFORMATION

ALWAYS add sodium hydroxide-solid to water with constant agitation. NEVER add water to the sodium hydroxide-solid.

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