

PHOTOGRAPHERS' FORMULARY

JD-4 (JARB) HOLOGRAPHY PROCESSING KIT

All the chemicals needed for making both transmission and reflection holograms using Slavich PFG-03M plate or film.

MAKES 1 LITER EACH OF 3 STOCK SOLUTIONS

The discovery of using JD-4 for quick processing of holograms recorded on Slavich PFG-03M plates and Tung H. Jeong, Riley Aumiller, Raymond Ro, and Jeff Blyth made film; thus it is called the **JARB** processing regime.

JD-4 is an alternative for GP-2 developer. The GP-2 has been used for decades for making excellent reflection holograms on the PFG-03M emulsion. Using GP-2, the sensitivity of PFG-03M is 1.5 mJ/cm² (milli-joules per square centimeter); the one-step processing takes 12-15 minutes; and the hologram requires natural drying, often takes over an hour. Also, using GP-2, the emulsion is extremely soft during development and washing, like jello; and can easily float off the glass. Thus, if time and patience is not a problem, GP-2 can be used to make excellent reflection holograms.

The advantage of JD-4 is that it increases the sensitivity of the PFG-03M to .15 mJ/cm². Thus the exposure time for hologram is one-tenth as long as when processed in GP-2. Also, drying time is drastically reduced by using warm air (from a hair dryer) because the JD-4 development hardens the emulsion. The total processing time using JD-4 can be as short as three minutes, from developing to drying!

Thus, JD-4 is ideal for making holograms during a lecture demonstration or for laboratory exercises or workshops where many students must make holograms in a limited time. For diehards who are accustomed to GP-2, they can continue to use it.

The composition of JD-4 is a modified version of what was originally intended for processing "BB" plates manufactured in Germany. It is mixed using three glass (or plastic) containers marked A, B, Bleach, each with 1 liter of distilled or de-ionized water. Disposable plastic bottles used for drinking water can be used (*exercise extreme caution in re-labeling the bottles and their placements to prevent accidental ingestion of the contents*).

FOR YOUR CHEMICAL SAFETY

All chemicals are dangerous and must be treated with respect. Please read all the warning labels on each package.

It is good practice to use eye goggles, dust mask, apron and rubber gloves when mixing chemicals.

HYDROQUINONE is considered by the EPA to be hazardous, and to be a skin sensitizer.

SODIUM HYDROXIDE: Although your kit contains only a small amount of solid Sodium Hydroxide, it must be treated with special care. Sodium Hydroxide, as a solid or in solution, is a dangerous chemical. It is a corrosive and when spilled on the skin, will cause a chemical burn.

Its action is insidious because the burn occurs without pain. When working with Sodium Hydroxide wash your hands frequently and without soap. If you detect a soapy feeling while washing, Sodium Hydroxide is present. In such a case, wash thoroughly with soap and water.

Beads or pellets of solid Sodium Hydroxide are easily spilled during solution preparation. If spillage occurs outside of a sink, all of the spilled solid must be cleaned up, use a damp disposable towel. If the solid is not cleaned up, it will absorb the moisture from the air and form a puddle of very caustic hydroxide, which will not evaporate. We strongly urge you to wear both safety glasses and rubber gloves when working with solid Sodium Hydroxide or its solutions.

We strongly urge you to wear both safety glasses and rubber gloves when working with solid sodium hydroxide and its solutions.

METOL: Some individuals become sensitized (develop allergic symptoms or rashes) when using metol. If this should occur, discontinue use and consult a physician.

MATERIAL SAFETY DATA SHEET

(M. S. D. S.)

SECTION – I, CHEMICAL IDENTIFICATION

NAME OF PRODUCT : METOL (p-METHYL AMINOPHENOL SULPHATE)
CHEMICAL FORMULA : $\text{HOC}_6\text{H}_4\text{NHCH}_3 \frac{1}{2} \text{H}_2\text{SO}_4$
CAS NO. : 55-55-0

SECTION – II, HAZARDS IDENTIFICATION

- TOXIC BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.
- IRRITATING TO EYES, RESPIRATORY SYSTEM AND SKIN.
- IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
- IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
- WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.

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SECTION - III, FIRST-AID MEASURES

- IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY AMOUNTS OF WATER FOR AT LEAST 15 MINUTES.
- IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS AMOUNTS OF WATER.
- IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
- IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS. CALL A PHYSICIAN.
- WASH CONTAMINATED CLOTHING BEFORE REUSE.

SECTION - IV, FIRE FIGHTING MEASURES

- EXTINGUISHING MEDIA
WATER SPRAY.
CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
- SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
- UNUSUAL FIRE AND EXPLOSIONS HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

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SECTION – V, ACCIDENTAL RELEASE MEASURES

- WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
- SWEEP UP, PLACE IN A BAG AND HOLD FOR WASTE DISPOSAL.
- VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

SECTION – VI, SAFE HANDLING / PERSONAL PROTECTION

- WEAR APPROPRIATE RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES.
- SAFETY SHOWER AND EYE BATH.
- USE ONLY IN A CHEMICAL FUME HOOD.
- DO NOT BREATHE DUST.
- AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
- AVOID PROLONGED OR REPEATED EXPOSURE.
- WASH THOROUGHLY AFTER HANDLING.
- TOXIC.
- IRRITANT.
- POSSIBLE SENSITIZER.
- KEEP TIGHTLY CLOSED.
- PROTECT FROM LIGHT.

SECTION – VII, PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR	: WHITE CRYSTALS, ODORLESS
PHYSICAL PROPERTIES	
MELTING POINT	: 260 ⁰ C (DEC)
AUTOIGNITION TEMPERATURE	: 531 ⁰ C

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SECTION -VIII, STABILITY AND REACTIVITY

- INCOMPATIBILITIES
ACIDS
ACIDS CHLORIDES
ACID ANHYDRIDES
OXIDIZING AGENTS
SENSITIVE TO LIGHT

- HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

THERMAL DECOMPOSITION MAY PRODUCE CARBON MONOXIDE, CARBON DIOXIDE, AND NITROGEN OXIDES.
SULFUR OXIDES.

SECTION -IX, TOXICOLOGICAL INFORMATION

ACUTE EFFECTS

- HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN.
- CAUSES EYE AND SKIN IRRITATION.
- MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
- PROLONGED OR REPEATED EXPOSURE MAY CAUSE ALLERGIC REACTIONS IN CERTAIN SENSITIVE INDIVIDUALS.
- TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

SECTION -X, OTHER INFORMATION

The information submitted is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processor from the responsibility of carrying out their own tests and experiments, neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed.

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UNIVAR USA INC.

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MSDS NO: P1349VS

MATERIAL SAFETY DATA SHEET

MAINFRAME UPLOAD DATE: 10/31/97

VERSION: 004

PRODUCT: ASCORBIC ACID, VITAMIN C

ORDER NO: 209212

PROD NO : 720201

PHOTOGRAPHERS FORMULARY

CALL IN ADVANCE TO MEET

7079 HWY 83 N.

BOX 89

CONDON ,MT 59826

UNIVAR USA INC.

6100 CARILLON POINT

, KIRKLAND

(425)889-3400

, WA 98033

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

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC

(800)424-9300

PRODUCT IDENTIFICATION

PRODUCT NAME: ASCORBIC ACID, VITAMIN C

MSDS #: P1349VS

DATE ISSUED: 9/26/97

SUPERSEDES: 1/18/96

ISSUED BY: 005201

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Chemical Name: Ascorbic Acid, Vitamin C

Trade Name: Ascorbic Acid, Vitamin C USP-FDC

Chemical Family: Organic

Formula: C₆H₈O₆

Molecular Weight: 176.12 g/mol

2. COMPOSITION / INFORMATION ON INGREDIENTS

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PRODUCT: ASCORBIC ACID, VITAMIN C

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Component CAS # Appr %

Ascorbic Acid 50-81-7 >99%

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Not available.

See product label for specific hazard warnings.

See MSDS Section 3 - "Symptoms of Exposure" for health hazard information.

Appearance: White powder to crystals

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

Symptoms of Exposure:

Eyes: May cause irritation on contact with the eyes.

Skin: May cause irritation on contact with the skin.

Inhalation: Expected to cause general respiratory tract irritation after inhalation of dust.

Ingestion: Material is virtually non-toxic.

Medical Cond. Aggravated by Exposure:
None known.

Routes of Entry:

Eye and skin contact and inhalation are anticipated as possible routes of exposure. Ingestion is not expected

Mutagenicity:

This material is not known to cause cancer in humans or animals.

4. FIRST AID MEASURES

Emergency First Aid:

Eyes: Flush with copious amounts of water for fifteen minutes. Get medical attention if symptoms persist.

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Skin: Remove excess material and wash affected skin with soap and water.
Gently dry area with a clean towel.

Inhalation: Remove to uncontaminated area. If not breathing give artificial
respiration. If breathing is difficult, give oxygen.

Ingestion: Induce vomiting if conscious and as directed by a physician.
Never give anything by mouth to an unconscious person. Get medical attention.

Notes EMS:

Emergency treatment information is not available for this product.

5. FIRE FIGHTING MEASURES

Flash Point (F): Not ignitable. Flash point not applicable.

Flammable Limits LEL (%): Not applicable.

Flammable Limits UEL (%): Not applicable.

Auto Ign: Not applicable.

Extinguishing Media:

Flood with water or use carbon dioxide, foam, or dry chemical.

Fire Fighting Procedures:

Positive pressure self-contained breathing apparatus and structural
firefighters' protective clothing as required for other materials
present.

Fire & Explosion Hazards:

Irritating or toxic gases, fumes, smoke, or particulates. Unusual fire or
explosion hazards are not expected. Relative hazard is anticipated to be the
same as normal combustible materials.

6. ACCIDENTAL RELEASE MEASURES

Spill Response:

Evacuate the area of all unnecessary personnel.

Wear suitable protective equipment listed under Exposure / Personal
Protection.

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Eliminate any ignition sources until the area is determined to be free from explosion or fire hazards.

Maintain the release and eliminate its source, if this can be done without risk.

Seal up and containerize for proper disposal as described under Disposal.

Comply with Federal, State, and local regulations on reporting releases.

Refer to Regulatory Information for reportable quantity and other regulatory data.

7. HANDLING AND STORAGE

Handling & Storage:

Keep container tightly closed. Store in general chemical storage. Protect against physical damage. Handle carefully. Store away from incompatible materials. Avoid generating dust or vapors.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT:

Ventilation, Respiratory Protection, Protective Clothing, Eye Protection
Safety goggles or safety glasses with side shields are required.

Provide adequate general mechanical ventilation and local exhaust ventilation.

Work / Hygienic Practices:

When handling quantities of material, be sure to wear appropriate protective equipment as described. Respirators must be worn when Permissible Exposure Limit (PEL) or Threshold Limit Value (TLV) is exceeded. Eye wash and safety shower should be readily available.

Wash thoroughly after handling. Do not take internally. Avoid breathing dust or vapor when generated.

Mechanical ventilation of work areas should be provided where the material is being used.

EXPOSURE GUIDELINES

HA - PEL:

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Component	TWA		STEL		CL		Skin
	PPM	MG/M3	PPM	MG/M3	PPM	MG/M3	

Ascorbic Acid

ACGIH - TLV:

Component	TWA		STEL		CL		Skin
	PPM	MG/M3	PPM	MG/M3	PPM	MG/M3	

Ascorbic acid

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (C 760 mmHg): Not applicable

Melting Point (C): 192 C

Specific Gravity (H2O = 1): not applicable

Bulk Density: N/A

Vapor Pressure (mm Hg): Not applicable.

Percent Volatile by Vol (%): <1% (volume)

Vapor Density (Air = 1): N/A

Evaporation Rate (BuAc = 1): Not applicable.

pH Aqueous Solution: Not determined

Solubility in Water (%): Soluble

Appearance: White powder to crystals

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions of storage or use.

Hazardous Polymerization:

Will not occur under normal conditions of storage or use.

Hazardous Decomposition:

Not determined

Conditions To Avoid:

NA

Materials To Avoid:

() Water

(X) Acids

(X) Bases

() Corrosives

(X) Oxidizers

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) Other :

11. TOXICOLOGICAL INFORMATION

Toxicity Data:

Not available. Material not fully investigated. Handle as a potentially toxic material.

Toxicological Findings:

No evaluation of toxicological data on this material is currently unavailable. See Section 3 of this MSDS for an overview of known or anticipated health effects.

12. DISPOSAL CONSIDERATIONS

Waste Numbers: N/A

Treatment:

Not applicable; material is a non-hazardous and non-regulated solid waste. Landfill and bulk or containerized wastes of this material to a secure industrial landfill or thermal oxidation facility. Incineration is not recommended for organics.

These methods are drawn from 40 CFR , Protection of Environment, and are to be applied only after thorough review of all applicable Methods of Treatment or Treatment Standards. The waste generator is advised to contract with a licensed Treatment, Storage, and Disposal facility when arranging for final disposal and to consult state and local authorities to determine whether any additional regulatory requirements need to be met.

13. TRANSPORT INFORMATION

T Proper Shipping Name: Not regulated.
T Technical Name: Technical name not required.
T ID Number: Not applicable.
T Hazard Class: Not applicable.
T Subsidiary Risk: Not applicable.
T Packing Group: N/A
T Label(s) Required: Not applicable.
T Other: Not applicable.

TA Proper Shipping Name: Not regulated.

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IATA ID Number: Not applicable.
IATA Hazard Class: Not applicable.
IATA Subsidiary Risk: Not applicable.
IATA Packing Group: N/A
IATA Label(s) Required: Not applicable.
IATA Other: Not applicable.

IMDG Proper Shipping Name: Not regulated.
IMDG ID Number: Not applicable.
IMDG Hazard Class: Not applicable.
IMDG Subsidiary Risk: Not applicable.
IMDG Packing Group: N/A
IMDG Label(s) Required: Not applicable.
IMDG Other: Not applicable.

14. REGULATORY INFORMATION

TSCA Inventory: N/A

TSCA Statement:

The components of this material appear in the Toxic Substances Control Act (TSCA) Chemical Substances Inventory and are available for commercial use.

OSHA Specifically Required

This material is not regulated by OSHA.

TSCA Memo: NONE

SARA Title III Hazard Categories:

Acute Health

Component	SARA EHS (302)	SARA EHS TPQ (lbs)	CERCLA RQ (lbs)
Ascorbic Acid			

Component	OSHA Floor List	SARA 313	DeMinimis for SARA 313 (%)
Ascorbic Acid			

15. OTHER INFORMATION

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Comments:

NE

HIS Hazard Ratings:

Health : 0
Flammability : 0
Reactivity : 0
Protective Equipment : A
Special Hazards : NA

A = NOT AVAILABLE

E = NOT ESTABLISHED

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

CONTACT: MSDS COORDINATOR

UNIVAR USA INC.

DURING BUSINESS HOURS, PACIFIC TIME

(425)889-3400

12/24/02 11:17 PRODUCT: 720201 CUST NO: 113365 ORDER NO: 209212

----- NOTICE -----

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SPECIFICATION SHEET AND/OR A CERTIFICATE OF ANALYSIS. THESE CAN BE OBTAINED FROM
YOUR LOCAL UNIVAR SALES OFFICE.

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*** END OF MSDS ***

PRODUCT: COPPER SULFATE NON FIFRA REGISTERED

ORDER NO: 221078
PROD NO : 681669

PHOTOGRAPHERS FORMULARY
C/O RETL DOCK MISSOULA
CALL BUD AND HE WILL
COME & PICK THESE UP.
MISSOULA ,MT 59808

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

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

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

PRODUCT NAME: COPPER SULFATE NON FIFRA REGISTERED

SDS NUMBER: MZC5918

EFFECTIVE DATE: 8/9/2001

REPLACES: 5/10/2001

ISSUED BY: 008614

1. PRODUCT IDENTIFICATION

SYNONYMS: COPPER (II) SULFATE PENTAHYDRATE (1:1:5); BLUE VITRIOL;
SULFURIC ACID COPPER (2+) SALT (1:1), PENTAHYDRATE
CAS NO: 7758-98-7 (ANHYDROUS) 7758-99-8 (PENTAHYDRATE)
MOLECULAR WEIGHT: 249.68
CHEMICAL FORMULA: CUSO4.5H2O

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS NO	PERCENT	HAZARDOUS
COPPER SULFATE	7758-98-7	100%	YES

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SDS NO: MZC5918

MATERIAL SAFETY DATA SHEET

AINFRAME UPLOAD DATE: 09/20/01

VERSION: 003

PRODUCT: COPPER SULFATE NON FIFRA REGISTERED

ORDER NO: 221078

PROD NO : 681669

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

WARNING! HARMFUL IF SWALLOWED, AFFECTS THE LIVER AND KIDNEYS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

POTENTIAL HEALTH EFFECTS

INHALATION:

CAUSES IRRITATION TO RESPIRATORY TRACT, SYMPTOMS MAY INCLUDE COUGHING, SORE THROAT, AND SHORTNESS OF BREATH. MAY RESULT IN ULCERATION AND PERFORATION OF RESPIRATORY TRACT. WHEN HEATED, THIS COMPOUND MAY GIVE OFF COPPER FUME, WHICH CAN CAUSE SYMPTOMS SIMILAR TO THE COMMON COLD, INCLUDING CHILLS AND STIFFNESS OF THE HEAD.

INGESTION:

MAY CAUSE BURNING PAIN IN THE MOUTH, ESOPHAGUS, AND STOMACH. HEMORRHAGIC GASTRITIS, NAUSEA, VOMITING, ABDOMINAL PAIN, METALLIC TASTE, AND DIARRHEA MAY OCCUR. IF VOMITING DOES NOT OCCUR IMMEDIATELY SYSTEMIC COPPER POISONING MAY OCCUR. SYMPTOMS MAY INCLUDE CAPILLARY DAMAGE, HEADACHE, COLD SWEAT, RARE PULSE, KIDNEY AND LIVER DAMAGE, CENTRAL NERVOUS EXCITATION FOLLOWED BY DEPRESSION, JAUNDICE, CONVULSIONS, BLOOD EFFECTS, PARALYSIS AND COMA. DEATH MAY OCCUR FROM SHOCK OR RENAL FAILURE. FATALITIES HAVE OCCURRED AS A RESULT OF INGESTING GRAM QUANTITIES OF COPPER SULFATE.

SKIN CONTACT:

MAY CAUSE IRRITATION AND ITCHING.

EYE CONTACT:

DUST MAY CAUSE IRRITATION. CONTACT MAY CAUSE CONJUNCTIVITIS, ULCERATION, OR EROSION OF THE CORNEA.

CHRONIC EXPOSURE:

PROLONGED OR REPEATED SKIN EXPOSURE MAY CAUSE DERMATITIS. PROLONGED OR REPEATED EXPOSURE TO DUSTS OF COPPER SALTS MAY CAUSE DISCOLORATION OF THE SKIN OR HAIR, BLOOD AND LIVER DAMAGE, ULCERATION AND PERFORATION OF THE NASAL SEPTUM, RUNNY NOSE, METALLIC TASTE, AND ATROPHIC CHANGES AND IRRITATION OF THE MUCOUS MEMBRANES.

AGGRAVATION OF PRE-EXISTING CONDITIONS:

PERSONS WITH PRE-EXISTING SKIN DISORDERS, IMPAIRED LIVER, KIDNEY, OR PULMONARY FUNCTION, GLUCOSE 6-PHOSPHATE-DEHYDROGENASE DEFICIENCY, OR PRE-EXISTING WILSON'S DISEASE MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

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4. FIRST AID MEASURES

INHALATION:

REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

INGESTION:

DO NOT INDUCE VOMITING IMMEDIATELY AS DIRECTED BY MEDICAL PERSONNEL. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. CALL A PHYSICIAN IMMEDIATELY.

SKIN CONTACT:

IN CASE OF CONTACT, WIPE OFF EXCESS MATERIAL FROM SKIN THEN IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE REUSE, CALL A PHYSICIAN.

EYE CONTACT:

IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, LIFTING LOWER AND UPPER EYELIDS OCCASIONALLY. GET MEDICAL ATTENTION IMMEDIATELY.

=====

5. FIRE FIGHTING MEASURES

HAZARD:

NOT CONSIDERED TO BE A FIRE HAZARD.

EXPLOSION:

NOT CONSIDERED TO BE AN EXPLOSION HAZARD. SEALED CONTAINER MAY RUPTURE DURING FIRE CONDITIONS FROM PRESSURE WATER VAPOR RELEASE.

FIRE EXTINGUISHING MEDIA:

USE ANY MEANS SUITABLE FOR EXTINGUISHING SURROUNDING FIRE. WATER SPRAY MAY BE USED TO KEEP FIRE EXPOSED CONTAINERS COOL.

SPECIAL INFORMATION:

IN THE EVENT OF A FIRE, WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE. WHEN HEATED ABOVE 110C (230F) MATERIAL WILL MELT. AVOID USING A DIRECT WATER STREAM ON MOLTEN MATERIAL AS IT MAY CAUSE SPLATTERING.

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RODUCT: COPPER SULFATE NON FIFRA REGISTERED

ORDER NO: 221078
PROD NO : 681669

6. ACCIDENTAL RELEASE MEASURES

ENTILATE AREA OF LEAK OR SPILL. KEEP UNNECESSARY AND UNPROTECTED PEOPLE
WAY FROM AREA OF SPILL. WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT AS
PECIFIED IN SECTION 8. SPILLS: PICK UP AND PLACE IN A SUITABLE CONTAINER
OR RECLAMATION OR DISPOSAL, USING A METHOD THAT DOES NOT GENERATE DUST. US
EGULATIONS (CERCLA) REQUIRE REPORTING SPILLS AND RELEASES TO SOIL, WATER
ND AIR IN EXCESS OF REPORTABLE QUANTITIES. THE TOLL FREE NUMBER FOR THE US
AST GUARD NATIONAL RESPONSE CENTER IS (800) 424-8802.

7. HANDLING AND STORAGE

EEP IN A TIGHTLY CLOSED CONTAINER, STORED IN A COOL, DRY, VENTILATED AREA.
ROTECT AGAINST PHYSICAL DAMAGE. ISOLATE FROM INCOMPATIBLE SUBSTANCES.
OLUTIONS ARE CORROSIVE TO MILD STEEL. CONTAINERS OF THIS MATERIAL MAY BE
AZARDOUSS WHEN EMPTY SINCE THEY RETAIN PRODUCT RESIDUES (DUST, SOLIDS);
BSERVE ALL WARNINGS AND PRECAUTIONS LISTED FOR THE PRODUCT.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

AIRBORNE EXPOSURE LIMITS:
OSHA PERMISSIBLE EXPOSURE LIMIT (PEL):
MG/M3 (TWA) FOR COPPER DUSTS & MISTS AS CU
ACGIH THRESHOLD LIMIT VALUE (TLV):
MG/M3 (TWA) FOR COPPER DUSTS & MISTS AS CU

VENTILATION SYSTEM:

SYSTEM OF LOCAL AND/OR GENERAL EXHAUST IS RECOMMENDED TO KEEP EMPLOYEE
XPOSURES BELOW THE AIRBORNE EXPOSURE LIMITS. LOCAL EXHAUST VENTILATION IS
ENERALLY PREFERRED BECAUSE IT CAN CONTROL THE EMISSIONS OF THE CONTAMINANT
T ITS SOURCE, PREVENTING DISPERSION OF IT INTO THE GENERAL WORK AREA.
LEASE REFER TO THE ACGIH DOCUMENT, "INDUSTRIAL VENTILATION, A MANUAL OF
ECOMMENDED PRACTICES", MOST RECENT EDITION, FOR DETAILS.

PERSONAL RESPIRATORS (NIOSH APPROVED):

F THE EXPOSURE LIMIT IS EXCEEDED AND ENGINEERING CONTROLS ARE NOT
EASIBLE, A HALF FACEPIECE PARTICULATE RESPIRATOR (NIOSH TYPE N95 OR BETTER
ILTERS) MAY BE WORN FOR UP TO TEN TIMES THE EXPOSURE LIMIT OR THE MAXIMUM
SE CONCENTRATION SPECIFIED BY THE APPROPRIATE REGULATORY AGENCY OR
ESPIRATOR SUPPLIER, WHICHEVER IS LOWEST.. A FULL-FACE PIECE PARTICULATE
ESPIRATOR (NIOSH TYPE R100 FILTERS) MAY BE WORN UP TO 50 TIMES THE
XPOSURE LIMIT, OR THE MAXIMUM USE CONCENTRATION SPECIFIED BY THE
PPROPRIATE REGULATORY AGENCY, OR RESPIRATOR SUPPLIER, WHICHEVER IS LOWEST.

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F OIL PARTICLES (E.G. LUBRICANTS, CUTTING FLUIDS, GLYCERINE, ETC.) ARE
RESENT, USE A NIOSH TYPE R OR P FILTER. FOR EMERGENCIES OR INSTANCES
HERE THE EXPOSURE LEVELS ARE NOT KNOWN, USE A FULL-FACEPIECE
OSITIVE-PRESSURE, AIR-SUPPLIED RESPIRATOR. WARNING: AIR-PURIFYING
ESPIRATORS DO NOT PROTECT WORKERS IN OXYGEN-DEFICIENT ATMOSPHERES.

KIN PROTECTION:

EAR PROTECTIVE GLOVES AND CLEAN BODY-COVERING CLOTHING.

YE PROTECTION:

SE CHEMICAL SAFETY GOGGLES. MAINTAIN EYE WASH FOUNTAIN AND QUICK-DRENCH
ACILITIES IN WORK AREA.

=====

9. PHYSICAL AND CHEMICAL PROPERTIES

PEARANCE:	BOILING POINT:
ANSSPARENT BLUE TRICLINIC	> 150C (> 302F)
RYSTALS OR CRYSTALLINE GRANULES	DECOMPOSES WITH LOSS OF 5H2O
2 POWDER,	
OR:	MELTING POINT:
ORLESS,	110C (230F) LOSES 4H2O @ THIS TEMPERATURE.
UBILITY:	VAPOR DENSITY (AIR=1):
..6G/100CC H2O @ 0C (32F)	NO INFORMATION FOUND.
ECIFIC GRAVITY:	VAPOR PRESSURE (MM HG):
28 @ 15.6C/4C	NO INFORMATION FOUND.
I:	EVAPORATION RATE (BUAC=1):
0 (0.2 M SOLUTION) (WATER=1):	SLOWLY EFFLORESCENT.
VOLATILES BY VOLUME @ 21C (70F):	

=====

10. STABILITY AND REACTIVITY

ABILITY:

ABLE UNDER ORDINARY CONDITIONS OF USE AND STORAGE.

ZARDOUSS DECOMPOSITION PRODUCTS:

EN HEATED TO DECOMPOSITION CUPRIC OXIDE AND SULFUR OXIDE MAY FORM.

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HAZARDOUS POLYMERIZATION:
ILL NOT OCCUR.

INCOMPATIBILITIES:
SUBSTANCE WILL IGNITE HYDROXYLAMINE. SOLUTIONS ARE ACIDIC AND CAN REACT
WITH MAGNESIUM TO EVOLVE FLAMMABLE HYDROGEN GAS. MAY REACT WITH ACETYLENE
TO FORM DANGEROUS ACETYLIDES.

CONDITIONS TO AVOID:
INCOMPATIBLES.

1. TOXICOLOGICAL INFORMATION

RAL RAT LD50: 300 MG/KG. INVESTIGATED AS A TUMORIGEN, MUTAGEN.

-----/CANCER LISTS/-----
---NTP CARCINOGEN---

INGREDIENT	KNOWN	ANTICIPATED	IARC CATEGORY
COPPER SULFATE (7758-98-7)	NO	NO	NONE

2. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE:
DATA FOR ANHYDROUS MATERIAL UNLESS OTHERWISE NOTED. WHEN RELEASED INTO THE
OIL, THIS MATERIAL IS NOT EXPECTED TO BIODEGRADE. WHEN RELEASED INTO THE
OIL, THIS MATERIAL MAY LEACH INTO GROUNDWATER. WHEN RELEASED INTO WATER,
THIS MATERIAL IS NOT EXPECTED TO BIODEGRADE. WHEN RELEASED INTO WATER, THIS
MATERIAL IS NOT EXPECTED TO EVAPORATE SIGNIFICANTLY. THIS MATERIAL IS
EXPECTED TO SIGNIFICANTLY BIOACCUMULATE. THIS MATERIAL HAS AN
EXPERIMENTALLY-DETERMINED BIOCONCENTRATION FACTOR (BCF) OF GREATER THAN
100. BIOACCUMULATION DATA FOR COPPER.

ENVIRONMENTAL TOXICITY:
THIS MATERIAL IS EXPECTED TO BE VERY TOXIC TO AQUATIC LIFE. THE
LC50/96-HOUR VALUES FOR FISH ARE LESS THAN 1 MG/L. THE LC50/72-HOUR VALUES
FOR ALGAE ARE LESS THAN 1 MG/L. TOXICITY DATA FOR COPPER.

3. DISPOSAL CONSIDERATIONS

WASTE THAT CANNOT BE SAVED FOR RECOVERY OR RECYCLING SHOULD BE MANAGED IN AN

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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.

1. TRANSPORT INFORMATION

DOMESTIC (LAND, D.O.T.)

PROPER SHIPPING NAME: RQ, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID,
N.O.S. (CUPRIC SULFATE)
HAZARD CLASS: 9
UN: UN3077 PACKING GROUP: III
INFORMATION REPORTED FOR PRODUCT/SIZE: 400LB

INTERNATIONAL (WATER, I.M.O.)

PROPER SHIPPING NAME: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.
(CUPRIC SULFATE)
HAZARD CLASS: 9
UN: UN3077 PACKING GROUP: III
INFORMATION REPORTED FOR PRODUCT/SIZE: 400LB

2. REGULATORY INFORMATION

-----/CHEMICAL INVENTORY STATUS - PART 1/-----

INGREDIENT	TSCA	EC	JAPAN	AUSTRALIA
CUPRIC SULFATE (7758-98-7)	YES	YES	YES	YES

-----/CHEMICAL INVENTORY STATUS - PART 2/-----

		--CANADA--		
INGREDIENT	KOREA	DSL	NDSL	PHIL.
CUPRIC SULFATE (7758-98-7)	YES	YES	NO	YES

-----/FEDERAL, STATE & INTERNATIONAL REGULATIONS - PART 1/-----

	-SARA 302-		-SARA 313-	
INGREDIENT	RQ	TPQ	LIST	CHEMICAL CATG
CUPRIC SULFATE (7758-98-7)	NO	NO	NO	COPPER COMPOUND

-----/FEDERAL, STATE & INTERNATIONAL REGULATIONS - PART 2/-----

-RCRA- TSCA-

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INGREDIENT CERCLA 261.33 8(D)
UPRIC SULFATE (7758-98-7) 10 NO NO

HEMICAL WEAPONS CONVENTION: NO TSCA 12(B): NO CDTA: NO
ARA 311/312: ACUTE: YES CHRONIC: YES FIRE: NO PRESSURE: NO
EACTIVITY: NO (PURE/SOLID)

USTRALIAAN HAZCHEM CODE: NONE ALLOCATED.
OISON SCHEDULE: S5

HMIS: THIS MSDS HAS BEEN PREPARED ACCORDING TO THE HAZARD CRITERIA OF
THE CONTROLLED PRODUCTS REGULATIONS (CPR) AND THE MSDS CONTAINS
ALL OF THE INFORMATION REQUIRED BY THE CPR.

=====

6. OTHER INFORMATION

FPA RATINGS:
EALTH: 2 FLAMMABILITY: 0 REACTIVITY: 0

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

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

09/29/04 14:34 PRODUCT: 681669 CUST NO: 113365 ORDER NO: 221078

----- NOTICE -----

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CONSEQUENTIAL DAMAGES. **

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PRODUCT SPECIFICATION. FOR PRODUCT SPECIFICATION INFORMATION REFER TO A PRODUCT
SPECIFICATION SHEET AND/OR A CERTIFICATE OF ANALYSIS. THESE CAN BE OBTAINED FROM
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EFFICIENCY, CONDITIONS OF USE ARE BEYOND UNIVAR'S CONTROL AND THEREFORE USERS
ARE RESPONSIBLE TO VERIFY THIS DATA UNDER THEIR OWN OPERATING CONDITIONS TO
DETERMINE WHETHER THE PRODUCT IS SUITABLE FOR THEIR PARTICULAR PURPOSES AND THEY
ASSUME ALL RISKS OF THEIR USE, HANDLING, AND DISPOSAL OF THE PRODUCT, OR FROM
THE PUBLICATION OR USE OF, OR RELIANCE UPON, INFORMATION CONTAINED HEREIN.
THIS INFORMATION RELATES ONLY TO THE PRODUCT DESIGNATED HEREIN, AND DOES NOT
RELATE TO ITS USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY OTHER
PROCESS.

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

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.
6100 CARILLON POINT , KIRKLAND

(425)889-3400
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

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MATERIAL SAFETY DATA SHEET

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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	99.5	NOT DETERMINED	NOT DETERMINED
7758-02-3			

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.

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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

PRODUCT: POTASSIUM BROMIDE

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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

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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/L

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.

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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

PRODUCT: POTASSIUM BROMIDE

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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

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----- 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

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RELATE TO ITS USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY OTHER
PROCESS.

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

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%

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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.

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- 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/m³, OSHA PEL ceiling=2 mg/m³.
- 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.



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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/dm³

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: LD₅₀-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*, LC₅₀, 96h, 125 mg/l @ pH>10. Crustaceans, *Ceriodaphnia*, EC₈₀, 48h, 40 mg/l @ pH>10.



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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:

<u>Symbols</u>	<u>C</u>	<u>Corrosive</u>
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



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(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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10-1110

REPORT NUMBER: 703 UNIVAR USA INC.
MSDS NO: P12108VS MATERIAL SAFETY DATA SHEET
MAINFRAME UPLOAD DATE: 05/26/05

PAGE: 001
VERSION: 011

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.
6100 CARILLON POINT , KIRKLAND

(425)989-3400
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

MATERIAL SAFETY DATA SHEET

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

Product Name: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL
Product Code: SBS01
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

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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 burn 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 Communication 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

PRODUCT: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL

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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

ORDER NO: 232929

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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

PRODUCT: SODIUM BISULFATE, ANHYDROUS GLOBULAR, TECHNICAL

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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 02B. 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 (VwWWS) - 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

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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

NOTICE

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SUFFICIENCY, CONDITIONS OF USE ARE BEYOND UNIVARS CONTROL AND THEREFORE USERS ARE RESPONSIBLE TO VERIFY THIS DATA UNDER THEIR OWN OPERATING CONDITIONS TO DETERMINE WHETHER THE PRODUCT IS SUITABLE FOR THEIR PARTICULAR PURPOSES AND THEY ASSUME ALL RISKS OF THEIR USE, HANDLING, AND DISPOSAL OF THE PRODUCT, OR FROM THE PUBLICATION OR USE OF, OR RELIANCE UPON , INFORMATION CONTAINED HEREIN. THIS INFORMATION RELATES ONLY TO THE PRODUCT DESIGNATED HEREIN, AND DOES NOT RELATE TO ITS USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY OTHER PROCESS.

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

REPORT NUMBER: 703

VAN WATERS & ROGERS INC.

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MSDS NO: MZS2245

MATERIAL SAFETY DATA SHEET

MAINFRAME UPLOAD DATE: 07/12/99

VERSION: 002

PRODUCT: SODIUM CARBONATE MONOHYDRATE / SODA ASH

ORDER NO: 178505

PROD NO : 628695

PHOTOGRAPHERS FORMULARY

CALL IN ADVANCE TO MEET

HC-31

BOX 89

CONDON ,MT 59806

VAN WATERS & ROGERS INC. , A ROYAL PAKHOED COMPANY (425)839-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

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

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

PRODUCT NAME: SODIUM CARBONATE MONOHYDRATE / SODA ASH

MSDS #: MZS2245

EFFECTIVE DATE: 7/9/99

SUPERSEDES: NEW

=====

SODIUM CARBONATE MONOHYDRATE

=====

1. PRODUCT IDENTIFICATION

SYNONYMS: CARBONIC ACID, DISODIUM SALT MONOHYDRATE; DISODIUM
CARBONATE MONOHYDRATE; SODA ASH

CAS NO: 497-19-8

MOLECULAR WEIGHT: 124.00

CHEMICAL FORMULA: Na2CO3.H2O

=====

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS NO	PERCENT	HAZARDOUS
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VAN WATERS & ROGERS INC.

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MSDS NO: MZS3245

MATERIAL SAFETY DATA SHEET

MAINFRAME UPLOAD DATE: 07/12/99

VERSION: 002

PRODUCT: SODIUM CARBONATE MONOHYDRATE / SODA ASH

ORDER NO: 178505

PROD NO : 628675

SODIUM CARBONATE 497-19-B 100% YES

=====

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

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

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 CONJUNCTIVAL 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.

AGGRAVATION OF PRE-EXISTING CONDITIONS:

NO INFORMATION FOUND.

=====

4. FIRST AID MEASURES

INHALATION:

REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. GET MEDICAL ATTENTION.

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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 TO BE AN EXPLOSION HAZARD. 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.

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7. HANDLING AND STORAGE

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. KEEP IN A TIGHTLY CLOSED CONTAINER, STORED IN A COOL, DRY, VENTILATED AREA. PROTECT AGAINST PHYSICAL DAMAGE. ISOLATE FROM INCOMPATIBLE SUBSTANCES.

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 THE DUST OR MIST IS APPARENT, A HALF-FACE DUST/MIST RESPIRATOR MAY BE WORN. FOR EMERGENCIES OR INSTANCES WHERE THE EXPOSURE LEVELS ARE NOT KNOWN, USE A FULL-FACE POSITIVE-PRESSURE, AIR-SUPPLIED RESPIRATOR. WARNING: AIR-PURIFYING RESPIRATORS DO NOT PROTECT WORKERS IN OXYGEN-DEFICIENT ATMOSPHERES.

SKIN PROTECTION:

WEAR 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 POWDER.

BOILING POINT:
400C (752F)

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PROD NO : 628495

ODOR:

ODORLESS.

MELTING POINT:

851C (1564F) LOSES WATER AT CA. 100C.

SOLUBILITY:

30 G/100 ML WATER @ 60C (140F)

VAPOR DENSITY (AIR=1):

NO INFORMATION FOUND.

DENSITY:

2.25

VAPOR PRESSURE (MM HG):

NO INFORMATION FOUND.

PH:

AQUEOUS SOLUTIONS ARE STRONGLY
ALKALINE.

EVAPORATION RATE (BUAC=1):

NO INFORMATION FOUND.

% VOLATILES BY VOLUME @ 21C (70F):

0

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, DUSTING AND INCOMPATIBLES.

11. TOXICOLOGICAL INFORMATION

FOR ANHYDROUS SODIUM CARBONATE: ORAL RAT LD50: 4090 MG/KG; INHALATION RAT
LC50: 2300 MG/H3/2H; IRRITATION EYE RABBIT: 50 MG SEVERE; INVESTIGATED AS A
MUTAGEN, REPRODUCTIVE EFFECTOR.

-----CANCER LISTS-----

---NTP CARCINOGEN---

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ORDER NO: 178505

PROD NO : 628695

INGREDIENT	KNOWN	ANTICIPATED	IARC	CATEGORY
SODIUM CARBONATE (497-19-8)	NO	NO	NONE	

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE:
NO INFORMATION FOUND.

ENVIRONMENTAL TOXICITY:
NO INFORMATION FOUND.

13. 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.

14. TRANSPORT INFORMATION

NOT REGULATED.

15. REGULATORY INFORMATION

-----CHEMICAL INVENTORY STATUS - PART 1-----				
INGREDIENT	TSCA	EC	JAPAN	AUSTRALIA
SODIUM CARBONATE (497-19-8)	YES	YES	YES	YES

-----CHEMICAL INVENTORY STATUS - PART 2-----				
INGREDIENT	KOREA	--CANADA--		PHIL.
		DSL	NDSL	
SODIUM CARBONATE (497-19-8)	YES	YES	NO	YES

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PRODUCT: SODIUM CARBONATE MONOHYDRATE / SODA ASH

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PROD NO : 628695

-----FEDERAL, STATE & INTERNATIONAL REGULATIONS - PART 1-----

INGREDIENT	-SARA 302-		-SARA 313-	
	EQ	TPQ	LIST	CHEMICAL CATG
SODIUM CARBONATE (497-19-8)	NO	NO	NO	NO

-----FEDERAL, STATE & INTERNATIONAL REGULATIONS - PART 2-----

INGREDIENT	CERCLA	-ECRA-	-TSCA-
		261.33	8(D)
SODIUM CARBONATE (497-19-8)	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)

AUSTRALIAN HAZCHEM CODE: NO INFORMATION FOUND.

POISON SCHEDULE: 55

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.

=====

16. OTHER INFORMATION

NFPA RATINGS:

HEALTH: 2 FLAMMABILITY: 0 REACTIVITY: 0

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

CONTACT: MSDS COORDINATOR

VAN WATERS & ROGERS INC.

DURING BUSINESS HOURS, PACIFIC TIME

(425)989-3400

09/21/99 07:05

PRODUCT: 628695

CUST NO: 113365

ORDER NO: 178505

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*** END OF MSDS ***