CATALOG NUMBER 01-0057

PHOTOGRAPHERS' FORMULARY

FORMULARY REPLENISHER DK-25R

TO MAKE 1 LITER

Formulary Replenisher DK-25R is used to extend the capacity of D-23 or D-25 from 4 rolls to 25 rolls per liter. As a developer is used, its action is weakened by both the chemical reduction of the exposed silver halides in the emulsion and by the release of bromide ions into the solution. The net results of reduced developer activity are reduction in the effective film speed and lower contrast. Adding replenisher ensures normal developer activity and partially counteracts the effects of the increased bromide concentration. The shelf life of the replenisher solution is six months.

FOR YOUR CHEMICAL SAFETY

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

Only one chemical, metol, used in the DK-25R kit needs special attention. Some individuals become sensitized to metol. If this should occur, discontinue use and see a physician.

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

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

MIXING THE REPLENISHER

You will need a 1 liter brown bottle or other suitable container.

We recommend you wear rubber gloves, splash goggles, dust mask and a rubber apron whenever mixing dry chemicals.

Chemical	Amount
Distilled Water (48° C/120° F)	750 ml
Metol	10 g
Sodium Sulfite	100 g
Sodium Metaborate	20 g
Cold water to make	1000 ml

Place the warm water in the storage container, add a pinch of sodium sulfite and stir the solution. This small amount of sodium sulfite minimizes the initial oxidation of the metol. If more of the sulfite is added at this point the metol will not dissolve. Next add the metol and stir until dissolved. It is important to dissolve all the metol before proceeding. After the metol has dissolved, add each chemical in order; making sure each has dissolved completely before adding the next. Finally add cold water to bring the total volume up to 1000 ml.

USING THE SOLUTION

The amount of replenisher that should be added to the working solution of D-23 or D-25 is proportional to the number of square inches of film that has been developed.

For D-23: add 23 ml of replenisher solution for each roll of film developed in one liter of working solution. Discard D-23 after 25 rolls have been developed, or after one month from first mixing the developer, whichever comes first.

For D-25: add 3 ml of the replenisher solution for each roll of film developed in working solution for the first 13 rolls of film developed. After 13 rolls of film, add 23 ml of replenished per roll of film per liter of working solution for the next 12 rolls of film. Discard D-25 after 25 rolls of film have been developed or one month after the developer was first mixed, whichever comes first.

10-07-10

MATERIAL SAFETY DATA SHEET
(M. S. D. S.)

SECTION – I, CHEMICAL IDENTIFICATION

NAME OF PRODUCT	:	METOL (p-METHYL AMINOPHENOL SULPHATE)
CHEMICAL FORMULA	:	$HOC_6H_4NHCH_3$ ½ H_2SO_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.

Continue on page....2

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.

Continue on page....3

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 BREATH DUST.
- AVOID CONTACT WITH EYES, SKIN AND CLOTHING.
- AVOID PROLONGED OR REPEATED EXPOSURE.
- WASH THROUGHLY 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

Continue on page....4

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.

MSDS Date: December 2, 2003
Emergency Contact: 1-800-424-9300

SECTION I

PRODUCT NAME: Sodium Sulfite, Catalyzed
CHEMICAL NAME: Sodium Sulfite, catalyzed
CHEMICAL FAMILY: Inorganic Sulfite
SYNONYMS: B 501; Catalyzed Anhydrous Sodium Sulfite
FORMULA: Na_2SO_3 + catalyst

DOT SHIPPING INFORMATION: Not DOT Regulated

SECTION II - HAZARDOUS INGREDIENTS

This material contains no ingredients which are known by Thatcher Company to be hazardous unless listed below.

HAZARDOUS MATERIAL	CAS NUMBER	w/w %	EXPOSURE LIMITS IN AIR
Sodium Sulfite	7757-83-7		TLV = 5 mg/m^3
Cobalt Sulfate (as Co)	10124-43-3		TLV = 0.05 mg/m^3* PEL = 0.1 mg/m^3

*recommended

The specific identity of some ingredients may be withheld for confidential business purposes. However, all known potential health effects from exposure to these ingredients are being addressed.

SECTION III - PHYSICAL DATA

BOILING POINT (F): N/A

SPECIFIC GRAVITY: 2.633 @ 15.4 EC

VAPOR PRESSURE (mm Hg): N/A

% VOLATILE, BY VOLUME: N/A

VAPOR DENSITY (air = 1): N/A

EVAPORATION RATE: N/A

SOLUBILITY IN WATER: Soluble

APPEARANCE AND ODOR: White to pink crystals or powder with saline, sulfurous taste.

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT: Nonflammable

FLAMMABLE LIMITS:
Lel: N/A Uel: N/A

EXTINGUISHING MEDIA:

Use any.

SPECIAL FIRE-FIGHTING PROCEDURES:
Wear self-contained breathing apparatus if necessary.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
When heated, catalyzed sodium sulfite decomposes and emits highly toxic fumes of sodium oxide and sulfur oxides.

SECTION V - REACTIVITY DATA

STABILITY: Stable

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS OR MATERIALS TO AVOID:
None.

HAZARDOUS DECOMPOSITION PRODUCTS:
When heated, catalyzed sodium sulfite decomposes and emits toxic fumes of sodium oxide and sulfur oxides.

SECTION VI - HEALTH HAZARD DATA

CARCINOGENIC LISTING:

NTP: No ingredients listed in this section.

IARC MONOGRAPHS: No ingredients listed in this section.

OSHA 29 CFR 1910: No ingredients listed in this section.

ENTRY ROUTES & EFFECTS OF OVEREXPOSURE:

Contact: Contact may irritate eyes.

Ingestion: If swallowed, can cause irritation of stomach, nausea and gas.

STATEMENT OF PRACTICAL TREATMENT:

Contact: Flush exposed area thoroughly with soap and water. For eyes, flush with cool water for at least 15 minutes. If irritation persists, get medical attention.

Ingestion: If swallowed, give several glasses of water and call a physician immediately.

SECTION VII - SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

Store in a cool, dry area .

STEPS TO BE TAKEN IF MATERIAL SPILLS OR LEAKS:

Wear proper safety equipment. Sweep up material and put into drums. Flush residue to sewer with large amounts of water (if permitted).

WASTE DISPOSAL METHOD:

Dispose of in landfill. Comply with all local, state and federal regulations.

OTHER PRECAUTIONS:

N/A

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Use dust mask as needed to avoid breathing dust.

VENTILATION:

Use adequate ventilation.

EYE PROTECTION:

Wear goggles or safety glasses.

SKIN PROTECTION:

Wear rubber gloves.

OTHER PROTECTIVE EQUIPMENT:

None required.

ACGIH = American Conference of Governmental Industrial Hygienists
CL = Ceiling Level
IARC = International Agency for Research on Cancer: Monographs
OSHA = Occupational Safety and Health Administration
N/A = Not Applicable
NTP = National Toxicology Program: Annual Report on Carcinogens
PEL = Permissible Exposure Level (OSHA)
TLV = Threshold Limit Value (ACGIH)
TWA = Time Weighted Average over 8 Hours
STEL = Short Term Exposure Limit (ACGIH)
ND = Not Determined

10-12-85
002 12/24/03 SODIUM METABORATE 8 MOL

PRODUCT NAME:
SODIUM METABORATE 8 MOL

MSDS #: BXSM8

MATERIAL SAFETY DATA SHEET
DATE OF ISSUE DECEMBER 2003
SUPERSEDES MAY 2000 VERSION
SODIUM METABORATE 8 MOL

1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: SODIUM METABORATE 8 MOL

GRADE: TECHNICAL

PRODUCT USE: INDUSTRIAL MANUFACTURING

CHEMICAL FORMULA: NABO2 4H2O
[NA2B2O4 8H2O]

CHEMICAL NAME/SYNONYMS: SODIUM METABORATE TETRAHYDRATE

CHEMICAL FAMILY: INORGANIC BORATES

CAS REGISTRY NUMBER: 10555-76-7
(REFER TO SECTION 15 FOR TSCA/DSL CHEMICAL INVENTORY LISTING)

MANUFACTURER:

U.S. BORAX INC.
26877 TOURNEY ROAD
VALENCIA, CA 91355-1847

EMERGENCY PHONE NUMBERS
24 HR. MEDICAL INFO. SERVICE: (661) 284-5200
CHEMTREC (SPILLS): (800) 424-9300

2 COMPOSITION/INFORMATION ON INGREDIENTS

THIS PRODUCT CONTAINS GREATER THAN 99 PERCENT (%) SODIUM METABORATE TETRAHYDRATE, NABO2 4H2O, WHICH IS HAZARDOUS UNDER THE OSHA HAZARD COMMUNICATION STANDARD AND UNDER THE CANADIAN CONTROLLED PRODUCTS REGULATIONS OF THE HAZARDOUS PRODUCTS ACT (WHMIS), BASED ON ANIMAL CHRONIC TOXICITY STUDIES. REFER TO SECTIONS 3 AND 11 FOR DETAILS ON HAZARDS.

3 HAZARD IDENTIFICATION

EMERGENCY OVERVIEW
SODIUM METABORATE 8 MOL IS A WHITE, ODORLESS, POWDERED SUBSTANCE THAT IS NOT FLAMMABLE, COMBUSTIBLE, OR EXPLOSIVE. AQUEOUS SOLUTIONS OF SODIUM METABORATE 8 MOL MAY BE STRONGLY ALKALINE. SODIUM METABORATE 8 MOL HAS A LOW ACUTE ORAL TOXICITY, BUT MAY RESULT IN DERMAL OR EYE IRRITATION DUE TO ALKALINITY.
POTENTIAL ECOLOGICAL EFFECTS
LARGE AMOUNTS OF SODIUM METABORATE 8 MOL CAN BE HARMFUL TO PLANTS AND OTHER SPECIES. THEREFORE, RELEASES TO THE ENVIRONMENT SHOULD BE MINIMIZED.
POTENTIAL HEALTH EFFECTS
ROUTES OF EXPOSURE: INHALATION IS THE MOST SIGNIFICANT ROUTE OF EXPOSURE IN OCCUPATIONAL AND OTHER SETTINGS. DERMAL EXPOSURE MAY BE A CONCERN BECAUSE OF SKIN IRRITATION FROM SODIUM METABORATE 8 MOL.

INHALATION: INHALATION IS LIKELY TO PRODUCE IRRITATION BECAUSE OF ITS ALKALINITY. AIRBORNE DUST CONCENTRATION SHOULD BE MAINTAINED BELOW 10 MG/M3.
EYE CONTACT: SODIUM METABORATE 8 MOL MAY CAUSE EYE DAMAGE. AVOID CONTACT WITH EYES. AQUEOUS SOLUTIONS OF SODIUM METABORATE 8 MOL MAY BE IRRITATING TO EYES UPON PROLONGED OR REPEATED CONTACT. ADEQUATE EYE PROTECTION SHOULD BE WORN.
SKIN CONTACT: SODIUM METABORATE 8 MOL MAY BE IRRITATING TO INTACT SKIN. REPEATED SKIN EXPOSURE SHOULD BE AVOIDED.
INGESTION: PRODUCTS CONTAINING SODIUM METABORATE 8 MOL ARE NOT INTENDED FOR INGESTION. SODIUM METABORATE 8 MOL HAS A LOW ACUTE TOXICITY. SMALL AMOUNTS (E.G., A TEASPOONFUL) SWALLOWED ACCIDENTALLY ARE NOT LIKELY TO CAUSE EFFECTS; SWALLOWING AMOUNTS LARGER THAN THAT MAY CAUSE GASTROINTESTINAL SYMPTOMS.
CANCER: SODIUM METABORATE 8 MOL IS NOT A KNOWN CARCINOGEN.
REPRODUCTIVE/DEVELOPMENTAL: ANIMAL INGESTION STUDIES IN SEVERAL SPECIES, AT HIGH DOSES, INDICATE THAT BORATES CAUSE REPRODUCTIVE AND DEVELOPMENTAL EFFECTS. A HUMAN STUDY OF OCCUPATIONAL EXPOSURE TO BORATE DUST SHOWED NO ADVERSE EFFECT ON REPRODUCTION.
TARGET ORGANS: NO TARGET ORGAN HAS BEEN IDENTIFIED IN HUMANS. HIGH DOSE ANIMAL INGESTION STUDIES INDICATE THE TESTES ARE THE TARGET ORGANS IN MALE ANIMALS.
SIGNS AND SYMPTOMS OF EXPOSURE: SYMPTOMS OF ACCIDENTAL OVER-EXPOSURE TO SODIUM METABORATE 8 MOL MIGHT INCLUDE NAUSEA, VOMITING AND DIARRHEA, WITH DELAYED EFFECTS OF SKIN REDNESS AND PEELING. THESE SYMPTOMS HAVE BEEN ASSOCIATED WITH THE ACCIDENTAL OVER-EXPOSURE TO THE RELATED SUBSTANCE BORIC ACID.
REFER TO SECTION 11 FOR DETAILS ON TOXICOLOGICAL DATA.

4 FIRST AID MEASURES

INHALATION: IF SYMPTOMS SUCH AS NOSE OR THROAT IRRITATION ARE OBSERVED, REMOVE PERSON TO FRESH AIR.
EYE CONTACT: BECAUSE OF ITS ALKALINITY, GREATER ATTENTION SHOULD BE GIVEN TO ADEQUATE EYE IRRIGATION. SEEK MEDICAL ATTENTION.
SKIN CONTACT: FLUSH SKIN WITH WATER. REMOVE CONTAMINATED CLOTHING. SEEK MEDICAL ATTENTION IF IRRITATION PERSISTS.
INGESTION: BECAUSE OF ITS ALKALINITY, SUPERFICIAL EFFECTS OF THE MOUTH AND ESOPHAGUS SHOULD BE MONITORED. IF IRRITATION IS NOTED, THEN SEEK MEDICAL ATTENTION.
NOTE TO PHYSICIANS: TREAT AS A MODERATELY STRONG ALKALI EXPOSURE. IN ADDITION, FOR INGESTION OF LARGE AMOUNTS (GREATER THAN 8 GRAMS), MAINTAIN ADEQUATE KIDNEY FUNCTION AND FORCE FLUIDS. GASTRIC LAVAGE IS RECOMMENDED FOR SYMPTOMATIC PATIENTS ONLY. HEMODIALYSIS SHOULD BE RESERVED FOR MASSIVE ACUTE INGESTION OR PATIENTS WITH RENAL FAILURE. BORON ANALYSES OF URINE OR BLOOD ARE ONLY USEFUL FOR DOCUMENTING EXPOSURE AND SHOULD NOT BE USED TO EVALUATE SEVERITY OF POISONING OR TO GUIDE TREATMENT1. REFER TO SECTION 11 FOR DETAILS.

5 FIRE FIGHTING MEASURES

GENERAL HAZARD: NONE, BECAUSE SODIUM METABORATE 8 MOL IS NOT FLAMMABLE, COMBUSTIBLE OR EXPLOSIVE. THE PRODUCT IS ITSELF A FLAME RETARDANT.
EXTINGUISHING MEDIA: ANY FIRE EXTINGUISHING MEDIA MAY BE USED ON NEARBY FIRES.
FLAMMABILITY CLASSIFICATION (29 CFR 1910.1200): NON-FLAMMABLE SOLID.

6 ACCIDENTAL RELEASE MEASURES

GENERAL: SODIUM METABORATE 8 MOL IS A WATER-SOLUBLE, WHITE POWDER THAT MAY, AT HIGH CONCENTRATIONS, CAUSE DAMAGE TO TREES

OR VEGETATION BY ROOT ABSORPTION. (REFER TO ECOLOGICAL INFORMATION, SECTION 12, FOR SPECIFIC INFORMATION.)
LAND SPILL: VACUUM, SHOVEL OR SWEEP UP SODIUM METABORATE 8 MOL AND PLACE IN CONTAINERS FOR DISPOSAL IN ACCORDANCE WITH APPLICABLE LOCAL REGULATIONS. AVOID CONTAMINATION OF WATER BODIES DURING CLEANUP AND DISPOSAL. PROTECTIVE CLOTHING, WATERPROOF GLOVES AND EYE PROTECTION SHOULD BE WORN WHEN CLEANING UP LAND SPILLS.
SPILLAGE INTO WATER: WHERE POSSIBLE, REMOVE ANY INTACT CONTAINERS FROM THE WATER. ADVISE LOCAL WATER AUTHORITY THAT NONE OF THE AFFECTED WATER SHOULD BE USED FOR IRRIGATION OR FOR THE ABSTRACTION OF POTABLE WATER UNTIL NATURAL DILUTION RETURNS THE BORON VALUE TO ITS NORMAL ENVIRONMENTAL BACKGROUND LEVEL. (REFER TO SECTIONS 12, 13 AND 15 FOR ADDITIONAL INFORMATION.)
SODIUM METABORATE 8 MOL IS A NON-HAZARDOUS WASTE WHEN SPILLED OR DISPOSED OF, AS DEFINED IN THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) REGULATIONS (40 CFR 261). (REFER TO REGULATORY INFORMATION, SECTION 15, FOR ADDITIONAL REFERENCES.)

7 HANDLING AND STORAGE

GENERAL: PROTECTIVE CLOTHING, WATERPROOF GLOVES AND EYE PROTECTION SHOULD BE WORN WHEN HANDLING SODIUM METABORATE 8 MOL. BUT DRY, INDOOR STORAGE IS RECOMMENDED. TO MAINTAIN PACKAGE INTEGRITY AND TO MINIMIZE CAKING OF THE PRODUCT, BAGS SHOULD BE HANDLED ON A FIRST-IN, FIRST-OUT BASIS. GOOD HOUSEKEEPING PROCEDURES SHOULD BE FOLLOWED TO MINIMIZE DUST GENERATION AND ACCUMULATION.
STORAGE TEMPERATURE: AMBIENT
STORAGE PRESSURE: ATMOSPHERIC
SPECIAL SENSITIVITY: MOISTURE (CAKING)

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: USE LOCAL EXHAUST VENTILATION TO KEEP AIRBORNE CONCENTRATIONS OF SODIUM METABORATE 8 MOL DUST BELOW PERMISSIBLE EXPOSURE LEVELS.
PERSONAL PROTECTION: PROTECTIVE CLOTHING, EYE GOGGLES AND GLOVES ARE RECOMMENDED FOR NORMAL INDUSTRIAL EXPOSURES. WHERE AIRBORNE CONCENTRATIONS ARE EXPECTED TO EXCEED EXPOSURE LIMITS, NIOSH/MSHA CERTIFIED RESPIRATORS SHOULD BE USED.
OCCUPATIONAL EXPOSURE LIMITS: SODIUM METABORATE TETRAHYDRATE (SODIUM METABORATE 8 MOL) IS TREATED BY OSHA, CAL OSHA AND ACGIH AS "PARTICULATE NOT OTHERWISE CLASSIFIED" OR NUISANCE DUST. THE OSHA/PEL (PERMISSIBLE EXPOSURE LEVEL) IS 15 MG/M3 TOTAL DUST AND 5 MG/M3 RESPIRABLE DUST. THE CAL OSHA/PEL IS 10 MG/M3. THE ACGIH/TLV (THRESHOLD LIMIT VALUE) IS 10 MG/M3 TOTAL DUST AND 3 MG/M3 RESPIRABLE DUST.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: WHITE, ODORLESS, CRYSTALLINE SOLID
SPECIFIC GRAVITY: 1.74
VAPOR PRESSURE: NEGLIGIBLE @ 20 C
SOLUBILITY IN WATER: 41.9% @ 20 C; 109.8% @ 100 C
MELTING POINT: 53.5 C (128 F)
PH @ 20 C: 10.5 (0.1% SOLUTION); 11.0 (1.0% SOLUTION); 11.4 (4.0% SOLUTION)
MOLECULAR WEIGHT: 137.88 ($NaBO_2 \cdot 4H_2O$)

10 STABILITY AND REACTIVITY

GENERAL: SODIUM METABORATE 8 MOL IS A STABLE PRODUCT.
INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID:
SODIUM METABORATE 8 MOL REACTS AS A WEAK ACID WHICH MAY CAUSE CORROSION OF BASE METALS. REACTION WITH STRONG REDUCING

AGENTS, SUCH AS METAL HYDRIDES OR ALKALI METALS, WILL GENERATE HYDROGEN GAS, WHICH COULD CREATE AN EXPLOSIVE HAZARD.
HAZARDOUS DECOMPOSITION: NONE.

11 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY
INGESTION: LOW ACUTE ORAL TOXICITY; LD50 IN RATS IS 2330 MG/KG OF BODY WEIGHT.
SKIN/DERMAL: NO EXPERIMENTAL DATA. LD50 IS EXPECTED TO BE GREATER THAN 2,000 MG/KG OF BODY WEIGHT.
INHALATION: NO EXPERIMENTAL DATA. OTHER BORATES INDICATE LOW ACUTE INHALATION TOXICITY. MANY YEARS OF OCCUPATIONAL EXPOSURE TO BORIC ACID AND OTHER BORATES INDICATE NO INCREASE IN PULMONARY DISEASE.
SKIN IRRITATION: PROBABLE SKIN IRRITANT BASED ON CHEMICAL PROPERTIES (ALKALINITY).
EYE IRRITATION: SODIUM METABORATE 8 MOL IS A PROBABLE EYE IRRITANT.
SENSITIZATION: NO EXPERIMENTAL TEST DATA. HOWEVER, OTHER BORATES ARE NOT SKIN SENSITIZERS.
OTHER
REPRODUCTIVE/DEVELOPMENTAL TOXICITY: ANIMAL FEEDING STUDIES IN RAT, MOUSE AND DOG, AT HIGH DOSES, HAVE DEMONSTRATED EFFECTS ON FERTILITY AND TESTES2. STUDIES WITH THE CHEMICALLY RELATED BORIC ACID IN THE RAT, MOUSE AND RABBIT, AT HIGH DOSES, DEMONSTRATE DEVELOPMENTAL EFFECTS ON THE FETUS, INCLUDING FETAL WEIGHT LOSS AND MINOR SKELETAL VARIATIONS3, 4. THE DOSES ADMINISTERED WERE MANY TIMES IN EXCESS OF THOSE TO WHICH HUMANS WOULD NORMALLY BE EXPOSED5.
CARCINOGENICITY/MUTAGENICITY: BORIC ACID DID NOT PRODUCE ANY EVIDENCE OF CARCINOGENICITY IN MICE6, NOR WAS ANY MUTAGENIC ACTIVITY OBSERVED IN A BATTERY OF SHORT-TERM MUTAGENICITY ASSAYS.
HUMAN DATA: HUMAN EPIDEMIOLOGICAL STUDIES SHOW NO INCREASE IN PULMONARY DISEASE IN OCCUPATIONAL POPULATIONS WITH CHRONIC EXPOSURES TO BORIC ACID DUST AND SODIUM BORATE DUST. A RECENT EPIDEMIOLOGY STUDY UNDER THE CONDITIONS OF NORMAL OCCUPATIONAL EXPOSURE TO BORATE DUSTS INDICATED NO EFFECT ON FERTILITY7.

12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA

GENERAL: BORON (B) IS THE ELEMENT IN SODIUM METABORATE TETRAHYDRATE (SODIUM METABORATE 8 MOL) WHICH IS USED BY CONVENTION TO REPORT BORATE PRODUCT ECOLOGICAL EFFECTS. IT OCCURS NATURALLY IN SEAWATER AT AN AVERAGE CONCENTRATION OF 5 MG B/L AND GENERALLY OCCURS IN FRESHWATER AT CONCENTRATIONS UP TO 1 MG B/L. IN DILUTE AQUEOUS SOLUTIONS THE PREDOMINANT BORON SPECIES PRESENT IS UNDISSOCIATED BORIC ACID. TO CONVERT SODIUM METABORATE TETRAHYDRATE INTO THE EQUIVALENT BORON (B) CONTENT, MULTIPLY BY 0.0784.
PHYTOTOXICITY: BORON IS AN ESSENTIAL MICRONUTRIENT FOR HEALTHY GROWTH OF PLANTS; HOWEVER, IT CAN BE HARMFUL TO BORON SENSITIVE PLANTS IN HIGHER QUANTITIES. CARE SHOULD BE TAKEN TO MINIMIZE THE AMOUNT OF SODIUM METABORATE 8 MOL RELEASED TO THE ENVIRONMENT.
ALGAL TOXICITY:
GREEN ALGAE, SCENEDESMUS SUBSPICATUS
96-HR EC10 = 24 MG B/L*
INVERTEBRATE TOXICITY8:
DAPHNIDS, DAPHNIA MAGNA STRAUS
24-HR EC50 = 242 MG B/L*
TEST SUBSTANCE: * SODIUM TETRABORATE
FISH TOXICITY:
SEAWATER9:
DAB, LIMANDA LIMANDA

96-HR LC50 = 74 MG B/L*
FRESHWATER10:
RAINBOW TROUT, S. GAIRDNERI (EMBRYO-LARVAL STAGE)
24-DAY LC50 = 88 MG B/L*
32-DAY LC50 = 54 MG B/L*
GOLDFISH, CARASSIUS AURATUS (EMBRYO-LARVAL STAGE)
7-DAY LC50 = 65 MG B/L*
3-DAY LC50 = 71 MG B/L*
ENVIRONMENTAL FATE DATA
PERSISTENCE/DEGRADATION: BORON IS NATURALLY OCCURRING AND UBIQUITOUS IN THE ENVIRONMENT. SODIUM METABORATE 8 MOL DECOMPOSES IN THE ENVIRONMENT TO NATURAL BORATE.
OCTANOL/WATER PARTITION COEFFICIENT: NO VALUE. IN AQUEOUS SOLUTION SODIUM METABORATE TETRAHYDRATE IS CONVERTED SUBSTANTIALLY INTO UNDISSOCIATED BORIC ACID.
SOIL MOBILITY: SODIUM METABORATE 8 MOL IS SOLUBLE IN WATER AND IS LEACHABLE THROUGH NORMAL SOIL.

13 DISPOSAL CONSIDERATIONS

DISPOSAL GUIDANCE: SMALL QUANTITIES OF SODIUM METABORATE 8 MOL CAN USUALLY BE DISPOSED OF AT LANDFILL SITES. NO SPECIAL DISPOSAL TREATMENT IS REQUIRED, BUT LOCAL AUTHORITIES SHOULD BE CONSULTED ABOUT ANY SPECIFIC LOCAL REQUIREMENTS. TONNAGE QUANTITIES OF PRODUCT ARE NOT RECOMMENDED TO BE SENT TO LANDFILLS. SUCH PRODUCT SHOULD, IF POSSIBLE, BE USED FOR AN APPROPRIATE APPLICATION.
RCRA (40 CFR 261): SODIUM METABORATE 8 MOL IS NOT LISTED UNDER ANY SECTIONS OF THE FEDERAL RESOURCE CONSERVATION AND RECOVERY ACT (RCRA).
NPRI (CANADA): SODIUM METABORATE 8 MOL IS NOT LISTED ON THE CANADIAN NATIONAL POLLUTANT RELEASE INVENTORY.
REFER TO SECTION 15 FOR ADDITIONAL REGULATORY INFORMATION.

14 TRANSPORT INFORMATION

DOT HAZARDOUS CLASSIFICATION: SODIUM METABORATE 8 MOL IS NOT REGULATED BY THE U.S. DEPARTMENT OF TRANSPORTATION (DOT) AND IS THEREFORE NOT CONSIDERED A HAZARDOUS MATERIAL/SUBSTANCE.
TDG CANADIAN TRANSPORTATION: SODIUM METABORATE 8 MOL IS NOT REGULATED UNDER TRANSPORTATION OF DANGEROUS GOODS (TDG).
INTERNATIONAL TRANSPORTATION: SODIUM METABORATE 8 MOL HAS NO UN NUMBER, AND IS NOT REGULATED UNDER INTERNATIONAL RAIL, ROAD, WATER OR AIR TRANSPORT REGULATIONS.

15 REGULATORY INFORMATION

OSHA/CAL OSHA: THIS MSDS DOCUMENT MEETS THE REQUIREMENTS OF BOTH OSHA (29 CFR 1910.1200) AND CAL OSHA (TITLE 8 CCR 5194 (G)) HAZARD COMMUNICATION STANDARDS. REFER TO SECTION 8 FOR REGULATORY EXPOSURE LIMITS.
WHMIS CLASSIFICATION: SODIUM METABORATE TETRAHYDRATE (SODIUM METABORATE 8 MOL) IS CLASSIFIED AS CLASS D-DIVISION 2A UNDER CANADIAN WHMIS GUIDELINES.
CHEMICAL INVENTORY LISTING: SODIUM METABORATE TETRAHYDRATE (SODIUM METABORATE 8 MOL), 7775-19-1, APPEARS ON SEVERAL CHEMICAL INVENTORY LISTS (INCLUDING THE EPA TSCA INVENTORY, CANADIAN DSL, EUROPEAN EINECS, JAPANESE MITI, AUSTRALIAN AND KOREAN LISTS) UNDER THE CAS NO. REPRESENTING THE ANHYDROUS FORM OF THIS INORGANIC SALT.
U.S. EPA TSCA INVENTORY 7775-19-1
CANADIAN DSL 77775-19-1
EINECS 231-891-6
SOUTH KOREA 9212-856
JAPANESE MITI (1)-69

RCRA: SODIUM METABORATE TETRAHYDRATE IS NOT LISTED AS A HAZARDOUS WASTE UNDER ANY SECTIONS OF THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) OR REGULATIONS (40 CFR 261 ET SEQ).
SUPERFUND: CERCLA/SARA. SODIUM METABORATE TETRAHYDRATE IS NOT LISTED UNDER CERCLA OR ITS 1986 AMENDMENTS, SARA, INCLUDING SUBSTANCES LISTED UNDER SECTION 313 OF SARA, TOXIC CHEMICALS, 42 USC 11023, 40 CFR 372.65, SECTION 302 OF SARA, EXTREMELY HAZARDOUS SUBSTANCES, 42 USC 11002, 40 CFR 355, OR THE CERCLA HAZARDOUS SUBSTANCES LIST, 42 USC 9604, 40 CFR 302.
SAFE DRINKING WATER ACT (SDWA): SODIUM METABORATE TETRAHYDRATE IS NOT REGULATED UNDER THE SDWA, 42 USC 300G-1, 40 CFR 141 ET SEQ. CONSULT STATE AND LOCAL REGULATIONS FOR POSSIBLE WATER QUALITY ADVISORIES REGARDING BORON COMPOUNDS.
CLEAN WATER ACT (CWA) (FEDERAL WATER POLLUTION CONTROL ACT): 33 USC 1251 ET SEQ.
A) SODIUM METABORATE TETRAHYDRATE (SODIUM METABORATE 8 MOL) IS NOT ITSELF A DISCHARGE COVERED BY ANY WATER QUALITY CRITERIA OF SECTION 304 OF THE CWA, 33 USC 1314.
B) IT IS NOT ON THE SECTION 307 LIST OF PRIORITY POLLUTANTS, 33 USC 1317, 40 CFR 129.
C) IT IS NOT ON THE SECTION 311 LIST OF HAZARDOUS SUBSTANCES, 33 USC 1321, 40 CFR 116.
CANADIAN DRINKING WATER GUIDELINE: AN "INTERIM MAXIMUM ACCEPTABLE CONCENTRATION" (IMAC) FOR BORON IS CURRENTLY SET AT 5 MG B/L.
IARC: THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) (A UNIT OF THE WORLD HEALTH ORGANIZATION) DOES NOT LIST OR CATEGORIZE SODIUM METABORATE TETRAHYDRATE AS A CARCINOGEN.
NTP BIENNIAL REPORT ON CARCINOGENS: SODIUM METABORATE TETRAHYDRATE IS NOT LISTED.
OSHA CARCINOGEN: SODIUM METABORATE TETRAHYDRATE IS NOT LISTED.
CALIFORNIA PROPOSITION 65: SODIUM METABORATE TETRAHYDRATE (SODIUM METABORATE 8 MOL) IS NOT LISTED ON THE PROPOSITION 65 LIST OF CARCINOGENS OR REPRODUCTIVE TOXICANTS.
CLEAN AIR ACT (MONTREAL PROTOCOL): SODIUM METABORATE 8 MOL WAS NOT MANUFACTURED WITH AND DOES NOT CONTAIN ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES.

16 OTHER INFORMATION

REFERENCES

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2) WEIR R J, FISHER R S, TOXICOL. APPL. PHARMACOL. 23: 351-364 (1972).
3) FAIL ET AL., FUND. APPL. TOXICOL. 17: 225-239 (1991).
4) PRICE ET AL., J. AM. COLL. TOXICOL. 14: (2), 173 (ABST. P-17) (1995).
5) MURRAY F J, REGUL. TOXICOL. PHARMACOL. (DEC. 1995).
6) NATIONAL TOXICOLOGY PROGRAM (NTP)-TOXICOLOGY AND CARCINOGENESIS STUDIES OF BORIC ACID IN B6C3F1 MICE, TECH. REPORT SER. NO. 324, U.S. DEPT. OF HEALTH AND HUMAN SERVICES. NIH PUBL. NO. 88-2580 (1987).
7) WHORTON ET AL., OCCUP. ENVIRON. MED. 51: 761-767 (1994).
8) SCHOBERL ET AL., TENSIDE SURFACTANTS DETERGENTS 25: 99-107 (1988).
9) HUGMAN S J, MANCE G, WATER RESEARCH CENTRE REPORT 616-M (1983).
10) BUTTERWICK L, DE OUDE N, RAYMOND K, ECOTOXICOL. ENVIRON. SAFETY 17: 339-371 (1989).
FOR GENERAL INFORMATION ON THE TOXICOLOGY OF INORGANIC BORATES, SEE PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY, 4TH ED., VOL. II, (1994), CHAP. 42, BORON; ECETOC TECH. REPORT NO. 63 (1995).

PRODUCT LABEL TEXT HAZARD INFORMATION*:
-MAY BE HARMFUL IF SWALLOWED.
-MAY CAUSE EYE DAMAGE.
-MAY BE IRRITATIONG TO SKIN.
-INGESTION MAY CAUSE REPRODUCTIVE HARM OR BIRTH DEFECTS BASED ON ANIMAL
-DATA. AVOID CONTAMINATION OF FOOD OR FEED.
-NOT FOR USE IN FOOD, DRUG OR PESTICIDES.
-REFER TO MSDS.
-KEEP OUT OF REACH OF CHILDREN.
*THE WHMIS PANEL FORMAT IS USED FOR CANADIAN PRODUCT.
NATIONAL FIRE PROTECTION ASSOC. (NFPA) CLASSIFICATION:
HEALTH 0
FLAMMABILITY 0
REACTIVITY 0
HAZARDOUS MATERIALS INFORMATION SYSTEMS (HMIS):
RED: (FLAMMABILITY) 0
YELLOW: (REACTIVITY) 0
BLUE: (ACUTE HEALTH) 1*
*CHRONIC EFFECTS

FOR FURTHER INFORMATION CONTACT:

U.S. BORAX INC.
OCCUPATIONAL HEALTH & PRODUCT SAFETY DEPARTMENT
(661) 287-6050

---------- FOR ADDITIONAL INFORMATION ----------
CONTACT: MSDS COORDINATOR UNIVAR USA INC.
DURING BUSINESS HOURS, PACIFIC TIME (425)889-3400
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* * * E N D O F M S D S * * *