Place the water in a mixing bowl and add the citric acid. Stir the mixture to dissolve the solid. Add sufficient water to bring the volume up to 1000 ml (or 2000 ml), stir to ensure it is homogenous, and then transfer the solution to a storage container.

LIFE OF THE SOLUTIONS

The shelf life of both the developer and the citric acid stop bath is in excess of six months provided that they are stored in full, tightly-capped bottles.

USING THE DEVELOPER

A typical developing sequence at 20°C/68°F is:

Develop:	10-12 minutes with slow films, or
	13-15 minutes with medium speed films, or
	18-20 minutes with fast films.
	[Return to the developing agent to its storage container. Increase the time of development by 10% after the first 2 rolls have been developed
Stop:	30 seconds using a citric acid stop bath
Fix:	2-4 minutes with Formulary TF-4 Rapid Fix (Cat. No. 03-0141)
Wash:	30 seconds
Clear:	1-2 minutes using Formulary Hypo Clear (Cat. No. 03-0165).
Wash:	5 minutes in running water.

PHOTOGRAPHERS' FORMULARY INC.

PO Box 950 • Condon MT 59826 • 406-754-2891 • FAX 406-754-2896
E-MAIL formulary @montana.com

PHOTOGRAPHERS' FORMULARY

FORMULARY MCM-100 FILM DEVELOPER

The MCM-100 formula was recommended to the Formulary by Robert A. Yajko. The developer contains two developing agents: p-phenylenediamine and catechol. P-Phenylenediamine produces negatives with extremely fine grain and catechol is incorporated to increase the film speed. This combination results in full film speed, very fine grain and superb tonal gradation.

A peculiarity of this combination of developing agents is that the emulsion side of the negative will have a high polish which will make it difficult to distinguish from the base side.

CHEMICALS CONTAINED IN THIS KIT

Your kit will contain the following chemicals:

	Kit Size	
Chemical	1-liter	2-liter
Potassium bromide	1 g	1 g
Citric Acid	15 g	30 g
Sodium sulfite	88 g	176 g
p-phenylenediamine	7 g	14 g
Catechol	9 g	18 g
Borax	2.3 g	4.6 g
Sodium phosphate, tribasic	3 g	6 g

CHEMICAL SAFETY

All chemicals are dangerous and must be treated with respect. Please read the warning on each package. This kit contains two chemicals that need special attention: p-phenylenediamine and catechol.

P-Phenylenediamine is toxic and has been reported to cause cancer in laboratory animals. Use extreme care in using this chemical. Wear rubber gloves when working with this compound or its solutions.
If spillage on the skin should occur, wash the area thoroughly with soap and water.

Clean the work area very carefully using soap and water or with a 1% solution of hydrochloric acid (about 3 ml of concentrated acid per 100 ml of water). The hydrochloric acid converts the p-phenylenediamine to a water soluble salt making the compound easier to remove.

Catechol (pyrocatechin), has a high vapor pressure and it is a phenol. The high vapor pressure means that solid catechol evaporates readily. When you open a bottle containing solid catechol, you can smell it. Always store solid catechol in a tightly-capped glass container. When mixing a solution containing catechol, work in a ventilated area. When catechol is in solution, its high vapor pressure is not a problem.

The fact that catechol is a phenol means that it is corrosive and can cause skin burns. If you should spill a solution of catechol, wash the area (or skin) with soap and water. Use tongs or rubber gloves whenever possible when working with this compound or its solutions.

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

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

MIXING THE DEVELOPER

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

You will need two brown bottles each with a capacity of 1 liter (or 2 liters) and a mixing bowl. You will also need a small mixing bowl (such as a glass or cup) with a capacity greater than 100 ml to prepare the 1% potassium bromide solution needed for mixing the developer.

Chemical	Amount
Distilled water (20° C/68° F)	100 ml
Potassium bromide	1 g

Both the 1 - liter and 2 - liter kits contain a package which has 1.0 g of potassium bromide. Place the potassium bromide in a mixing container and add 100 ml of water. Stir the solution until the solid has dissolved. Be sure that the solution is homogenous before it is added to the developer solution.

Not all of the 1% solution of potassium bromide will be used in mixing the developer. The excess can be discarded or saved for use as a restrainer in another developer. The solution was mixed in the manner described to ensure that an accurate amount of the restrainer would be added to the developer.

Working Solution

Chemical	Kit Size: 1 liter	Kit Size: 2 liter
Water (125° F/52° C)	750 ml	1500 ml
Sodium sulfite	88 g	176 g
p-Phenylenediamine	7 g	14 g
Catechol	9 g	18 g
Borax	2.3 g	4.6 g
Sodium phosphate, tribasic	3 g	6 g
1% Potassium bromide solution	20 ml	40 ml
Water (68° F/20° C) to make	1000 ml	2000 ml

Due to the potential hazard of the chemicals used in this formula, it is prudent to wear rubber gloves (such as Playtex®-type gloves) and mix the solution in a sink so that all spilled chemicals and mixing utensils can be cleaned up easily.

Place the warm water in a mixing bowl, add the sodium sulfite, and stir until the solid has dissolved.

Transfer the p-phenylenediamine from its shipping bottle to the developer solution, then recap the shipping bottle and discard it in the trash. Stir the solution until dissolved. Next, add the catechol, followed by the borax and sodium phosphate. After each solid has been added, stir the solution to dissolve it. Be sure each solid has dissolved before the next is added.

After all the solids have been added, add 20 ml (or 40 ml) of the 1% potassium bromide solution. Finally, add sufficient water to bring the volume up to 1000 ml (2000 ml), stir the solution to ensure it is homogenous, and then transfer it to its storage container.

Citric Acid Stop Bath

Chemical	Kit Size: 1 liter	Kit Size: 2 liter
Water (20° C/68° F)	750 ml	1500 ml
Citric acid	15 g	30 g
Water to make	1000 ml	2000 ml

RT NUMBER: 703
NO: GC003068
CTIVE DATE: 11/23/92

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

VERSION: 002

UCT: SODIUM SULFITE

ORDER NO: 141120
PROD NO : 503217

PHOTOGRAPHERS FORMULARY
C/O UNITED FRT. TERMINAL

KALISPELL ,MT 59906

WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
CARILLON POINT , KIRKLAND , WA 98033

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

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

---------- FOR PRODUCT AND SALES INFORMATION ----------

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE AT
VW&R SPOKANE 509-534-0405 SPOKANE , WA

DUCT NAME:
IUM SULFITE

S #: GC003068

GENERAL INFORMATION

DE NAME (COMMON NAME): SODIUM SULFITE, SULFTECH(TM) grade Sodium Sulfite
.S. No. 7757-83-7
MICAL NAME AND/OR SYNONYM: Sodium Sulfite
MULA: Na2SO3
ECULAR WEIGHT: 126.04
RESS: GENERAL CHEMICAL CORPORATION
90 East Halsey Road
Parsippany, NJ 07054-0389
CONTACT: Manager of Product Safety
PHONE NUMBER: (201) 515-1840
RENT ISSUE DATE: July, 1990

FIRST AID MEASURES

EMERGENCY PHONE NUMBER: (800) 631-8050
S: Immediately flush with plenty of water, for at least 15 minutes. Get medical attention.
N: Promptly wash with plenty of soap and water.
ALATION: Remove to fresh air. If symptoms persist, get medical attention.

GESTION: If conscious, immediately give 2 to 4 glasses of water or milk and induce vomiting by touching finger to back of throat. Get immediate medical attention.

HAZARDS INFORMATION

ALTH -
HALATION: Inhalation of product dust or mist may irritate respiratory tract. Contact with acids liberates irritating and potentially fatal sulfur dioxide gas.
GESTION: Ingestion may irritate gastrointestinal tract. Estimated to be moderately toxic. May cause severe allergic reaction in some asthmatics and sulfite sensitive individuals. Large doses may cause violent colic and diarrhea, circulatory disturbances, central nervous system depression and even death.--Reference (a).
IN: Dust or mist may cause skin irritation from prolonged contact. Solutions will irritate. See pH, Section F. Rabbit and guinea pig data available, Reference (b).
ES: Dust or mist may irritate or burn eyes. Solutions will irritate or burn. See pH, Section F.
RMISSIBLE CONCENTRATION: AIR: (SEE SECTION J)
None established for sodium sulfite.
OSHA/TWA for SO2 = 2 ppm
OSHA/STEL for SO2 = 5 ppm
BIOLOGICAL: None established.
USUAL CHRONIC TOXICITY: See Section K.
RE AND EXPLOSION -
ASH POINT: Not flammable.
ITO IGNITION TEMPERATURE: NA
AMMABLE LIMITS IN AIR (% BY VOL.): LOWER - NA UPPER - NA
USUAL FIRE AND EXPLOSION HAZARDS: See Hazardous Decomposition Products, Section G.

PRECAUTIONS/PROCEDURES

IRE EXTINGUISHING AGENTS RECOMMENDED: NA
IRE EXTINGUISHING AGENTS TO AVOID: NA
PECIAL FIRE FIGHTING PRECAUTIONS: Wear NIOSH-approved self-contained breathing apparatus. Use water-spray to keep containers cool, and to knock down fumes.
ENTILATION: LOCAL EXHAUST if dusty or misty condition prevails. LOCAL EXHAUST if there is release of sulfur dioxide gas, see Section G. Keep incompatible materials out of hoods, ducts, etc.
ORMAL HANDLING: Avoid contact with eyes, skin, clothing. Avoid breathing dust or mist. Use with adequate ventilation.
TORAGE: Store in a cool, dry area, away from acids or oxidizers. Keep container closed. Protect from physical damage.
PILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT - SECTION E):

Promptly shovel up dry chemical into an empty container, and cover. Store as above. Cautiously spray residue with plenty of water. (See Section I for disposal methods.)
CIAL: PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS: SIGNAL WORD - WARNING! Contact with acids releases irritating and potentially fatal sulfur dioxide gas. See drum-handling instructions on label. When dissolving, add water cautiously and with stirring.

PERSONAL PROTECTIVE EQUIPMENT

PIRATORY PROTECTION: If dusty of misty conditions prevail, use dust or mist respirator approved by NIOSH. If sulfur dioxide should be released (see Section G), use respiratory protection approved by NIOSH for this gas.--Reference (c).
S AND FACE: If exposed to dust or mist or solution, wear hard hat (or other head covering) and chemical safety goggles. Do not wear contact lenses.
DS, ARMS, AND BODY: Wear full work-clothing, including long-sleeved shirt and trousers for routine product-handling. Cotton gloves are usually adequate for dry product. For solutions, wear impervious gloves and apron. If contact is repeated or prolonged, wear full impervious clothing.
ER CLOTHING AND EQUIPMENT: Eyewash facility.

PHYSICAL DATA

ERIAL IS (AT NORMAL CONDITIONS): SOLID
EARANCE AND ODOR: White granular crystals or powder. Odorless.
LING POINT: Decomposes 900 Degrees C
TING POINT: ND
CIFIC GRAVITY (H2O=1): 2.63
OR DENSITY (AIR=1): NA
UBILITY IN WATER (% by Weight): (Calculated as the anhydrous salt)
17% solution at 10 Degrees C
28% solution at 33.4 Degrees C
1% solution; pH=9.8 (approx.)
OR PRESSURE (mm Hg at 20 Degrees C): NA
APORATION RATE (Ether=1): NA (Butyl Acetate = 1): NA
OLATILES BY VOLUME (At 20 Degrees C): NA

REACTIVITY DATA

ABILITY: STABLE
DITIONS TO AVOID: High temperature (before melting); yield sulfur dioxide gas and hazardous residue (details below).
COMPATIBILITY (MATERIALS TO AVOID): STRONG OXIDIZERS cause vigorous exothermic reactions.
ACIDS release sulfur dioxide gas (details below).

ZARDOUS DECOMPOSITION PRODUCTS: SULFUR DIOXIDE GAS: toxic and corrosive.
SODIUM SULFIDE RESIDUE: flammable, dangerous fire risk, strong irritant to skin and tissue, incompatible with acids.
ZARDOUS POLYMERIZATION: WILL NOT OCCUR
NDITIONS TO AVOID: NA

HAZARDOUS INGREDIENTS (Mixtures Only)

TERIAL OR COMPONENT/C.A.S. #: Not Applicable.

ENVIRONMENTAL

EGRADABILITY/AQUATIC TOXICITY:
Aquatic Toxicity: 2600 ppm/24, 48 & 96 hr/mosquito fish/TLm/fresh water.
Biological Oxygen Demand (BOD): 0.12 lb/lb, instantaneous.--Reference (d).
CTANOL/WATER PARTITION COEFFICIENT: NO
PA HAZARDOUS SUBSTANCES (CLEAN WATER ACT SEC. 311): NO
IF SO REPORTABLE QUANTITY: -- (40 CFR 116-117)
ASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS): Dissolve in water, using caution as solution can get hot. Neutralize with acid and flush to sewer with plenty of water if permitted by applicable disposal regulations. Good ventilation is required during neutralization due to release of SO2 gas. Oxidation to sodium sulfate solution may be required, as for example, by adding a slight excess of dilute hydrogen peroxide carefully and with stirring. Neutralized waste may have to be disposed of by an approved contractor.
CRA STATUS OF UNUSED MATERIAL IF DISCARDED: Not a "hazardous waste". (40 CFR 261)
AZARDOUS WASTE NUMBER: (IF APPLICABLE): NA

. REFERENCES

ERMISSIBLE CONCENTRATION REFERENCES:
None.
EGULATORY STANDARDS:
FDA regulations apply to the use of food grade material (21 CFR).
.O.T. CLASSIFICATION: Not Regulated (49 CFR 173)
ENERAL:

(a) Monograph 139, "Sulfite Salts", Gosselin, R.E. et al., CLINICAL TOXICOLOGY OF COMMERCIAL PRODUCTS, 4th Ed., 1976.
(b) NIOSH, REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES, 1981-82, P881 - 154478, No. WE215.00 00.
(c) NIOSH/OSHA "Pocket Guide to Chemical Hazards", DHHS (NIOSH) Pub. No. 78-210, 1978, Gov't. Printing Office, Washington 20402.
(d) Coast Guard CHRIS system form SSF, "Sodium Sulfite", Oct. 1978.

(. ADDITIONAL INFORMATION

Sodium sulfite has been demonstrated to be mutagenic in microbial systems;

ver, it is not mutagenic in studies involving insects and is not idered to present a mutagenic threat to multicell organisms, (i.e. nals, humans).
product is not for drug or food use unless so labeled.
food grade product, the following applies:
Effective July 9, 1986, the FDA has banned the use of "Sulfiting Agent" or "Sulfites" on fruits and vegetables intended to be served or sold raw to consumers.
Effective July 9, 1987, the FDA is requiring when a sulfite is present in a detectable amount in a finished food, regardless of whether it has been directly or indirectly added via one or more of the food ingredients, it must be declared on the label. The regulation defines a "detectable amount" of sulfite to be 10 ppm.
Sulfiting agents or sulfites are not to be used on foods or meats recognized as a source of Vitamin B1.

TNOTE: ND = NOT DETERMINED NA = NOT APPLICABLE
* = PROPRIETARY - TRADE SECRET

)DUCT: SODIUM SULFITE

ORDER NO: 141120
PROD NO : 503217

FOR ADDITIONAL INFORMATION

:ONTACT: MSDS COORDINATOR VW&R SPOKANE
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

08/24/94 10:21 PRODUCT: 503217 CUST NO: 113365 ORDER NO: 141120

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FFICIENCY. CONDITIONS OF USE ARE BEYOND VW&RS CONTROL AND THEREFORE USERS
E RESPONSIBLE TO VERIFY THIS DATA UNDER THEIR OWN OPERATING CONDITIONS TO
TERMINE WHETHER THE PRODUCT IS SUITABLE FOR THEIR PARTICULAR PURPOSES AND THEY
SUME ALL RISKS OF THEIR USE, HANDLING, AND DISPOSAL OF THE PRODUCT, OR FROM
E PUBLICATION OR USE OF, OR RELIANCE UPON , INFORMATION CONTAINED HEREIN.
IS INFORMATION RELATES ONLY TO THE PRODUCT DESIGNATED HEREIN, AND DOES NOT
LATE TO ITS USE IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY OTHER
OCESS.

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

6-95

UCT: POTASSIUM BROMIDE 10-0930

ORDER NO: 149578
PROD NO : 614395

PHOTOGRAPHERS FORMULARY
CALL IN ADVANCE TO MEET
C/O UNITED FRT. TERMINAL

MISSOULA ,MT 59801

I WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
10 CARILLON POINT , KIRKLAND , WA 98033

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

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

----------PRODUCT IDENTIFICATION----------

DDUCT NAME: POTASSIUM BROMIDE CAS NO.: 7758-02-3
MMON NAMES/SYNONYMS: POTASSIUM SALT VW&R CODE: P1866
BROMIDE

RMULA: K BR DATE ISSUED: 08/89
ZARD RATING (NFPA 704 CRITERIA) SUPERCEDES: 07/87
HEALTH: 0 HAZARD RATING SCALE:
FIRE: 0 0=MINIMAL 3=SERIOUS
REACTIVITY: 0 1=SLIGHT 4=SEVERE
SPECIAL: NONE 2=MODERATE

----------HAZARDOUS INGREDIENTS----------

		EXPOSURE LIMITS, MG/M3			
		OSHA	ACGIH	OTHER	
COMPONENT	%	PEL	TLV	LIMIT	HAZARD
TASSIUM BROMIDE	>99	NONE	NONE	10(DOW)	NONE

----------PHYSICAL PROPERTIES----------

ILING POINT, DEG F: 2516 VAPOR PRESSURE, MM HG/20 DEG C: N/A
LTING POINT, DEG F: 1346 VAPOR DENSITY (AIR=1): N/A
ECIFIC GRAVITY (WATER=1): 2.75 WATER SOLUBILITY, %: 70
PEARANCE AND ODOR: EVAPORATION RATE (BUTYL ACETATE=1): N/A
ITE CRYSTALLINE SOLID; ODORLESS

ODUCT: POTASSIUM BROMIDE

ORDER NO: 149578
PROD NO : 614395

----------FIRST AID MEASURES----------

F INHALED: REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF NOT REATHING. GET IMMEDIATE MEDICAL ATTENTION.

N CASE OF EYE CONTACT: IMMEDIATELY FLUSH EYES WITH LOTS OF RUNNING ATER FOR 15 MINUTES, LIFTING THE UPPER AND LOWER EYELIDS OCCASIONALLY. ET IMMEDIATE MEDICAL ATTENTION.

N CASE OF SKIN CONTACT: IMMEDIATELY WASH SKIN WITH LOTS OF SOAP AND ATER. REMOVE CONTAMINATED CLOTHING AND SHOES; WASH BEFORE REUSE. GET IEDICAL ATTENTION IF IRRITATION PERSISTS AFTER WASHING.

:F SWALLOWED: IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING BY GIVING 2 ;LASSES OF WATER AND STICKING A FINGER DOWN THE THROAT. GET IMMEDIATE 1EDICAL ATTENTION. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS)R CONVULSING PERSON.

----------HEALTH HAZARD INFORMATION----------

PRIMARY ROUTES OF EXPOSURE: SKIN OR EYE CONTACT

SIGNS AND SYMPTOMS OF EXPOSURE

INHALATION: BREATHING DUST MAY IRRITATE THE NOSE AND THROAT AND CAUSE COUGHING AND CHEST DISCOMFORT.

EYE CONTACT: DUSTS MAY IRRITATE THE EYES AND CAUSE SLIGHT TRANSIENT CORNEAL INJURY.

SKIN CONTACT: NO IRRITATION IS LIKELY AFTER BRIEF CONTACT BUT MAY BE IRRITATING OR CAUSE A BURN AFTER PROLONGED CONTACT WITH WET OR ABRADED SKIN.

SWALLOWED: LOW SINGLE DOSE TOXICITY.

CHRONIC EFFECTS OF EXPOSURE: REPEATED EXCESSIVE OVEREXPOSURE MAY CAUSE NAUSEA, VOMITING, MUSCULAR WEAKNESS, INCOORDINATION, DEPRESSION, PSYCHOSIS, ENDOCRINE EFFECTS, DEPRESSION OF THE HEART, ACNEFORM DERMATITIS. BROMISM HAS BEEN REPORTED IN OFFSPRING OF MOTHERS WHO ALSO HAD BROMIDE POISONING AS A RESULT OF INGESTION OF BROMIDES DURING PRENANCY.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE REPORTED.

----------TOXICITY DATA----------

ORAL: NO DATA FOUND

)DUCT: POTASSIUM BROMIDE

ORDER NO: 149578
PROD NO : 614395

'RMAL: NO DATA FOUND

)HALATION: NO DATA FOUND

.RCINOGENICITY: THIS MATERIAL IS NOT CONSIDERED TO BE A CARCINOGEN
' THE NATIONAL TOXICOLOGY PROGRAM, THE INTERNATIONAL AGENCY FOR
:SEARCH ON CANCER, OR THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

'HER DATA: BROMIDE ION HAS BEEN SHOWN TO INTERFERE WITH FERTILITY IN
NIMAL STUDIES.

----------PERSONAL PROTECTION----------

:NTILATION: LOCAL MECHANICAL EXHAUST VENTILATION CAPABLE OF MINIMIZING
JST EMISSIONS AT THE POINT OF USE.

ESPIRATORY PROTECTION: IF USE CONDITIONS GENERATE DUSTS, WEAR A NIOSH-
PPROVED RESPIRATOR APPROPRIATE FOR THOSE EMISSION LEVELS. APPROPRIATE
ESPIRATORS MAY BE A FULL FACEPIECE OR A HALF MASK AIR-PURIFYING CART-
IDGE RESPIRATOR WITH PARTICULATE FILTERS, A SELF-CONTAINED BREATHING
PPARATUS IN THE PRESSURE DEMAND MODE, OR A SUPPLIED-AIR RESPIRATOR.
BSENCE OF ADEQUATE ENVIRONMENTAL CONTROLS AT THE POINT OF USE.

'YE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS. IT IS GENERALLY
ECOGNIZED THAT CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH
HEMICALS BECAUSE CONTACT LENSES MAY CONTRIBUTE TO THE SEVERITY OF AN
'YE INJURY.

'ROTECTIVE CLOTHING: LONG-SLEEVED SHIRT, TROUSERS, SAFETY SHOES, AND
;LOVES.

:THER PROTECTIVE MEASURES: AN EYEWASH AND SAFETY SHOWER SHOULD BE
)EARBY AND READY FOR USE.

----------FIRE AND EXPLOSION INFORMATION----------

'LASH POINT, DEG F: N/A
METHOD USED: N/A

FLAMMABLE LIMITS IN AIR, %
LOWER: N/A UPPER: N/A

EXTINGUISHING MEDIA: THIS MATERIAL IS NOT COMBUSTIBLE. USE EXTIN-
;UISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES: FIRE FIGHTERS SHOULD WEAR SELF-
:ONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. USE WATER
'PRAY TO COOL NEARBY CONTAINERS AND STRUCTURES EXPOSED TO FIRE.
:ONTAINED BREATHING APPARATUS.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE.

RODUCT: POTASSIUM BROMIDE

ORDER NO: 149578
PROD NO : 614395

----------HAZARDOUS REACTIVITY----------

TABILITY: STABLE

POLYMERIZATION: WILL NOT OCCUR

ONDITIONS TO AVOID: NONE

IATERIALS TO AVOID: ACIDS, OXIDIZING MATERIALS.

AZARDOUS DECOMPOSITION PRODUCTS: WILL LIBERATE TOXIC FUMES OF HYDROGEN
ROMIDE AND/OR BROMINE.

----------SPILL, LEAK, AND DISPOSAL PROCEDURES----------

CTION TO TAKE FOR SPILLS OR LEAKS: WEAR PROTECTIVE EQUIPMENT INCLUDING
UBBER BOOTS, RUBBER GLOVES, RUBBER APRON, AND A FULL FACEPIECE OR A
ALF MASK AIR-PURIFYING CARTRIDGE RESPIRATOR WITH PARTICULATE FILTERS.
EAR CHEMICAL GOGGLES IF A HALF MASK IS WORN. FOR SMALL SPILLS, SWEEP
P AND DISPOSE OF IN DOT-APPROVED WASTE CONTAINERS. FOR LARGE SPILLS,
HOVEL INTO DOT-APPROVED WASTE CONTAINERS. KEEP OUT OF SEWERS, STORM
RAINS, SURFACE WATERS, AND SOIL.
OMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS ON SPILL REPORTING,
AND HANDLING AND DISPOSAL OF WASTE.
RUBBER BOOTS, RUBBER GLOVES, RUBBER APRON, AND CHEMICAL GOGGLES. FOR
SMALL SPILLS, SWEEP UP AND DISPOSE OF IN DOT-APPROVED WASTE CONTAINERS.
FOR LARGE SPILLS, SHOVEL INTO DOT-APPROVED WASTE CONTAINERS.
COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS ON SPILL REPORTING,
AND HANDLING AND DISPOSAL OF WASTE.

DISPOSAL METHODS: DISPOSE OF CONTAMINATED PRODUCT AND MATERIALS USED
IN CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL.
CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO
ASCERTAIN PROPER DISPOSAL PROCEDURES.
NOTE: EMPTY CONTAINERS CAN HAVE RESIDUES, GASES AND MISTS AND ARE
SUBJECT TO PROPER WASTE DISPOSAL, AS ABOVE.

----------SPECIAL PRECAUTIONS----------

STORAGE AND HANDLING PRECAUTIONS: STORE IN A COOL, DRY, WELL-VENTILATED
PLACE AWAY FROM INCOMPATIBLE MATERIALS. KEEP BAGS OR FIBER DRUMS DRY AT
ALL TIMES. WASH THOROUGHLY AFTER HANDLING. DO NOT GET IN EYES, ON
SKIN, OR ON CLOTHING.
CONTAINERS DRY AT ALL TIMES. WASH THOROUGHLY AFTER HANDLING. DO NOT GET
IN EYES, ON SKIN, OR ON CLOTHING.

REPAIR AND MAINTENANCE PRECAUTIONS: NONE.

OTHER PRECAUTIONS: CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, WILL

ODUCT: POTASSIUM BROMIDE

ORDER NO: 149578
PROD NO : 614395

ETAIN PRODUCT RESIDUE. ALWAYS OBEY HAZARD WARNINGS AND HANDLE EMPTY
ONTAINERS AS IF THEY WERE FULL.

----------REVISION----------

7/87: CORRECTED NFPA REFERENCE AND PHYSICAL DATA. REVISED SKIN
ONTACT FIRST AID, PERSONAL PROTECTION, FIRE FIGHTING INFORMATION,
ECOMPOSITION PRODUCTS, SPILL AND LEAK PROCEDURES, AND HANDLING
DVICE.

8/89: CHANGED HEADING AND CONTACT INFORMATION.

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

CONTACT: MSDS COORDINATOR VAN WATERS & ROGERS INC.
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

11/06/95 12:59 PRODUCT: 614395 CUST NO: 113365 ORDER NO: 149578

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RE RESPONSIBLE TO VERIFY THIS DATA UNDER THEIR OWN OPERATING CONDITIONS TO
ETERMINE WHETHER THE PRODUCT IS SUITABLE FOR THEIR PARTICULAR PURPOSES AND THEY
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ROCESS.

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

10-0410 Read 3-18-94

REPORT NUMBER: 971
MSDS NO: HX17029
EFFECTIVE DATE: 03/14/94

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

PRODUCT: CITRIC ACID, ANHYDROUS

ORDER NO:
PROD NO :

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

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

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

---------- FOR PRODUCT AND SALES INFORMATION ----------

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE AT
VW&R SPOKANE 509-534-0405 SPOKANE , WA

I. PRODUCT IDENTIFICATION:

PRODUCT NAME.....: Citric Acid, Anhydrous

PRODUCT CODE.....: 0701, 0702, 0703, 0704

CHEMICAL FAMILY.....: Organic Acid

CHEMICAL NAME.....: 2-Hydroxy-1,2,3 Propanetricarboxylic Acid

CAS NUMBER.....: 77-92-9

FORMULA.....: C6H8O7

MSDS #: HX17029

II. HAZARDOUS INGREDIENTS:

INGREDIENT NAME /CAS NUMBER	EXPOSURE LIMITS	CONCENTRATION (%)
2-Hydroxy-1,2,3 Propanetricarboxylic Acid 77-92-9	OSHA : 5.000 mg/m3 (respirable dust) ACGIH: 5.000 mg/m3 (respirable dust)	100.000 %

PRODUCT: CITRIC ACID, ANHYDROUS

ORDER NO:
PROD NO :

III. PHYSICAL PROPERTIES:

PHYSICAL FORM.....: Crystals
APPEARANCE.....: Free flowing crystalline
COLOR.....: White
ODOR.....: Odorless with a strong acid taste
pH .....: Not Established
BOILING POINT.....: Not Applicable
MELTING/FREEZING POINT....: Not Applicable
SOLUBILITY IN WATER .....: 59.2 g/100g at 68 F (20 C)
SOLUBILITY (NON AQUEOUS)..: Methyl alcohol: 197 g/100g at 66.2 F (19 C)
SPECIFIC GRAVITY .....: Not Established
BULK DENSITY.....: Not Established
% VOLATILE BY VOLUME.....: Not Applicable
VAPOR PRESSURE .....: Not Applicable

IV. FIRE AND EXPLOSION DATA:

FLASH POINT.....: Not Established
AUTO-IGNITION TEMPERATURE.....: Not Established
EXTINGUISHING MEDIA.....: Water; Dry Chemical; Carbon Dioxide
SPECIAL FIRE FIGHTING PROCEDURES: Firefighters should be equipped with self-contained breathing apparatus to protect against potentially toxic and irritating fumes. Avoid dusting. Dust can form explosive mixtures with air.

V. HUMAN HEALTH DATA:

ROUTE(S) OF ENTRY.....: Inhalation; Skin Contact; Eye Contact

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE:

ACUTE SKIN CONTACT.....: This product is irritating to the skin resulting in reddening, stinging, and swelling.

ACUTE EYE CONTACT.....: This product is irritating to the eyes resulting in stinging, reddening, tearing, and swelling.

CHRONIC EFFECTS OF EXPOSURE...: No applicable information was found concerning any adverse chronic health effects from overexposure to this product.

CARCINOGENICITY.....: The components of this product are not listed by NTP, IARC or regulated as a carcinogen by OSHA.

MEDICAL CONDITIONS
AGGRAVATED BY EXPOSURE.....: Persons with pre-existing eye or skin disorders may be more susceptible to the effects of this product.

EXPOSURE LIMITS.....: Although no exposure limit has been established for this product, the OSHA-PEL for nuisance dust of 15 mg/m3-total dust, 5 mg/m3-respirable dust is recommended. In addition, the ACGIH-TLV for nuisance dust of 10 mg/m3 is recommended.

VI. EMERGENCY AND FIRST AID PROCEDURES:

FIRST AID FOR EYES.....: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician immediately.

FIRST AID FOR SKIN.....: In case of contact, remove contaminated clothing, and flush skin with plenty of water for at least 15 minutes. Wash clothing before reuse. Call a physician.

VI. FIRST AID PROCEDURES (Continued)

FIRST AID FOR INHALATION: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

FIRST AID FOR INGESTION.: If swallowed, call a physician.

VII. EMPLOYEE PROTECTION RECOMMENDATIONS:

EYE PROTECTION REQUIREMENTS.....: Chemical safety goggles.

SKIN PROTECTION REQUIREMENTS.....: Rubber or vinyl gloves and long sleeved shirts and pants to minimize skin contact. Employees should wash their hands and face before eating, drinking or using tobacco products.

RESPIRATOR REQUIREMENTS.....: Work ambient concentrations should be monitored and if the recommended exposure limit is exceeded, a NIOSH/MSHA approved dust respirator should be worn.

VENTILATION REQUIREMENTS.....: Use local ventilation if dusting is a problem, to maintain air levels below the recommended exposure limit.

ADDITIONAL PROTECTIVE MEASURES.....: Emergency showers and eye wash stations should be made available. Educate and train employees in the safe use and

handling of this product.

VIII. REACTIVITY DATA:

STABILITY.....: This is a stable material.
HAZARDOUS POLYMERIZATION...: Will not occur.
INCOMPATIBILITIES.....: Reaction with caustic can create heat (strong exotherm). Solutions are mildly corrosive to steel.
carbon
INSTABILITY CONDITIONS.....: None Known.
DECOMPOSITION PRODUCTS.....: In case of fire CO, CO2 and other potentially toxic fumes.

IX. SPILL AND LEAK PROCEDURES:

SPILL OR LEAK PROCEDURES....: Clean by vacuum or broom sweeping and remove to disposal container.

WASTE DISPOSAL METHOD.....: Cover with soda ash or sodium bicarbonate to neutralize. Mix and add water if necessary. Scoop up slurry and dispose in accordance with existing federal, state and local environmental control regulations.

X. SPECIAL PRECAUTIONS & STORAGE DATA:

STORAGE TEMPERATURE(MIN/MAX): Max. 405 F (207 C)(product deteriorates)

SHELF LIFE.....: Not Established

SPECIAL SENSITIVITY.....: None Known.

HANDLING/STORAGE PRECAUTIONS: Avoid breathing dust. Avoid contact with eyes and skin. Wash thoroughly after handling. Store in a dry place away from excessive heat, in original or similar waterproof containers. Reseal containers immediately after use.

XI. SHIPPING INFORMATION:

TECHNICAL SHIPPING NAME.....: Organic Acid
FREIGHT CLASS BULK.....: Chemicals, NOI
FREIGHT CLASS PACKAGE.....: Chemicals, NOI, (NMFC 60000)
PRODUCT LABEL.....: Citric Acid, Anhydrous, FCC, USP

PRODUCT: CITRIC ACID, ANHYDROUS

ORDER NO:
PROD NO :

DOT (HM-181) (DOMESTIC SURFACE)

HAZARD CLASS OR DIVISION .....: Non-Regulated

IMO / IMDG CODE (OCEAN)

HAZARD CLASS DIVISION NUMBER...: Non-Regulated

ICAO / IATA (AIR)

HAZARD CLASS DIVISION NUMBER...: Non-Regulated

XII. ANIMAL TOXICITY DATA:

NO ANIMAL TOXICITY INFORMATION AVAILABLE

XIII. FEDERAL REGULATORY INFORMATION:

OSHA STATUS.....: This product is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA STATUS.....: On TSCA Inventory

CERCLA REPORTABLE QUANTITY..: None

SARA REPORTABLE QUANTITY....: Exempt from SARA Title III reporting; contains no section 313 toxic chemical. It may contain up to the FCC limits for arsenic (1 ppm), lead (0.5 ppm), and heavy metals (5 ppm, as lead).

RCRA STATUS.....: If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-24)

FDA STATUS.....: Citric Acid meets the specifications given in the Third Edition of the Food Chemicals Codex and is in chemical compliance with 21 CFR

PRODUCT: CITRIC ACID, ANHYDROUS

ORDER NO:
PROD NO :

182.1033 as a Multiple Purpose Generally Recognized As Safe Food Substance. Citric Acid meets the specifications given in the USP XXII including USP XXII Supplement 7.

XIV. OTHER REGULATORY INFORMATION:

The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

COMPONENT NAME /CAS NUMBER	CONCENTRATION	STATE CODE
2-Hydroxy-1,2,3 Propanetricarboxylic Acid 77-92-9	100.000 %	PA3, NJ4

NJ4 = New Jersey Other - included in 5 predominant ingredients > 1%

PA3 = Pennsylvania Non-hazardous present at 3% or greater.

HMIS RATINGS:

Health	Flammability	Reactivity
1	0	0

0=Minimal 1=Slight 2=Moderate 3=Serious 4=Severe

The manufacturer's method of hazard communication is comprised of Product Labels and Material Safety Data Sheets. HMIS ratings are provided by H&R as a customer service.

XV. APPROVALS:

APPROVAL DATE.....: 06/24/93

SUPERSEDES DATE.....: None

MSDS NUMBER.....: 17029

REPORT NUMBER: 971
MSDS NO: HX17029
EFFECTIVE DATE: 03/14/94

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

PAGE: 1

VERSION: 1

PRODUCT: CITRIC ACID, ANHYDROUS

ORDER NO:
PROD NO :

FOR ADDITIONAL INFORMATION

CONTACT: MSDS COORDINATOR VW&R SPOKANE
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

03/15/94 10:33 PRODUCT: CUST NO: ORDER NO:

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

10-0260 Recd 3-18-94

REPORT NUMBER: 971
MSDS NO: BX1911
EFFECTIVE DATE: 09/29/93

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

VERSION: 001

PRODUCT: BORAX

ORDER NO:
PROD NO :

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

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

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

---------- FOR PRODUCT AND SALES INFORMATION ----------

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE AT
VW&R SPOKANE 509-534-0405 SPOKANE , WA

PRODUCT NAME:
BORAX

MSDS #: BX1911

1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:	BORAX
Grades:	Technical, S.Q., NF
Chemical Formula:	$Na_2B_4O_7 \cdot 10H_2O$
Chemical Name/Synonyms:	Sodium Tetraborate Decahydrate, Disodium Tetraborate Decahydrate
Chemical Family:	Inorganic Borates
CAS Registry Number:	1303-96-4
TSCA Inventory Number:	1303-96-4

2 COMPOSITION/INFORMATION ON INGREDIENTS' OSHA HAZARDS

This product contains greater than 99 percent (%) Sodium Tetraborate Decahydrate ($Na_2B_4O_7 \cdot 10H_2O$) CAS No. 1303-96-4. Sodium Tetraborate Decahydrate is hazardous under the OSHA Hazard Communication Standard based on animal chronic toxic studies of similar inorganic borate chemicals.

Occupational Exposure Limits: OSHA: Permissible Exposure

Limit (PEL) - 10 mg/m3
ACGIH: Threshold Limit Value (TLV) - 5 mg/m3
Cal OSHA: Permissible Exposure Limit (PEL) - 5 mg/m3
Refer to Sections 3 and 11 for details on hazards.

3 HAZARD IDENTIFICATION EMERGENCY OVERVIEW:

Sodium Tetraborate Decahydrate is a white oderless, powdered substance that is not flammable, combustible, or explosive, and it presents no unusual hazard if involved in a fire. Sodium Tetraborate Decahydrate presents little or no hazard (to humans) and has low acute oral and dermal toxicities. Care should be taken to minimize the amount of Sodium Tetraborate Decahydrate released to the environment to avoid ecological effects.

POTENTIAL ECOLOGICAL EFFECTS:

Large amounts of Sodium Tetraborate Decahydrate can be harmful to boron-sensitive plants and other ecological systems.

POTENTIAL HEALTH EFFECTS:

Routes of Exposure: Inhalation is the most significant route of exposure in occupational and other settings. Dermal exposure is not usually a concern because Sodium Tetraborate Decahydrate is not absorbed through intact skin.
Inhalation: Occasional mild irritation effects to nose and throat may occur from inhalation of Sodium Tetraborate Decahydrate dusts at levels greater than 10 mg/m3.
Eye Contact: Sodium Tetraborate Decahydrate is non-irritating to eyes in normal industrial use.
Skin Contact: Sodium Tetraborate Decahydrate does not cause irritation to intact skin.
Ingestion: Products containing Sodium Tetraborate Decahydrate are not intended for ingestion. Sodium Tetraborate Decahydrate has a relatively 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 Tetraborate Decahydrate is not considered a carcinogen.
Reproductive: Long-term, high dose animal ingestion studies of similar inorganic borate chemicals have demonstrated reproductive effects in male animals. A human study of occupational exposure to borate dust showed no adverse effect to reproduction.
Developmental: High dose animal ingestion studies of similar inorganic borate chemicals have demonstrated

developmental effects in fetuses of pregnant animals, including fetal weight loss.

Target Organs: No target organ has been identified in humans. High dose animal ingestion studies of similar inorganic borate chemicals indicate the testes are the target organs in male animals.

Signs and Symptoms of Exposure: Symptoms of accidental over-exposure to borate products have been associated with ingestion or by absorption through large areas of damaged skin. These may include nausea, vomiting, and diarrhea, with delayed effects of skin redness and peeling.

Refer to Section 11 for details on Toxicological Data.

4 FIRST AID MEASURES

Inhalation: No specific treatment is necessary since Sodium Tetraborate Decahydrate is not likely to be hazardous by inhalation. Prolonged exposure to dust levels in excess of regulatory limits should always be avoided.

Eye Contact: Use eye wash fountain or fresh water to cleanse eye. If irritation persists for more than 30 minutes, seek medical attention.

Skin Contact: No treatment necessary because non-irritating.

Ingestion: Swallowing less than one teaspoon will cause no harm to healthy adults. If larger amounts are swallowed, give two glasses of water to drink and seek medical attention.

NOTE TO PHYSICIANS: Observation only is required for adult ingestion of a few grams of Sodium Tetraborate Decahydrate.

For ingestion of larger amounts, 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 treatment. (Further Information: Litovitz T.L., Norman, S.A., Veltri, J. C., Annual Report of the American Association of Poison Control Centers Data Collection System. Am. J. Emerg. Med. 1986; 4:427-458). 24 hour Medical consultation is available at (800) 228-5635 EXT. 144.

5 FIRE-FIGHTING MEASURES

General Hazard: None, because Sodium Tetraborate Decahydrate 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 Tetraborate Decahydrate is a water-soluble white powder that may 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 Tetraborate Decahydrate and place in containers for disposal in accordance with applicable local regulations. Avoid contamination of water bodies during clean up and disposal. No personal protective equipment is needed to clean up land spills.

Water Spill: Sodium Tetraborate Decahydrate will cause localized contamination of surrounding waters depending on the quantity dissolved in these waters. At high concentrations the damage to local vegetation, fish and other aquatic life may be expected. (Refer to Sections 12, 13 and 15 for additional information).

Sodium Tetraborate Decahydrate 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 and information regarding EPA and California regulations.)

7 HANDLING AND STORAGE

Storage Temperature: Ambient
Storage Pressure: Atmospheric
Special Sensitivity: Moisture (Caking)

General: No special handling precautions are required, 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.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use local exhaust ventilation to keep airborne concentrations of Sodium Tetraborate Decahydrate dust below permissible exposure levels.

Personal Protection: Where airborne concentrations are

expected to exceed exposure limits, NIOSH/MSHA certified respirators must be used. Eye goggles and gloves are not required for normal industrial exposures, but may be warranted if environment is excessively dusty.

Occupational Exposure Limits: Sodium Tetraborate Decahydrate is listed/regulated by OSHA, Cal OSHA and ACGIH.

OSHA: PEL* - 10 mg/m3
ACGIH: TLV** - 5 mg/m3
Cal OSHA: PEL* - 5 mg/m3

* PEL = "Permissible Exposure Limit"
** TLV = "Threshold Limit Value"

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White, odorless, crystalline solid
Specific Gravity:	1.71
Vapor Pressure:	Negligible @ 200C
Solubility in Water:	5.8% @ 200C; 65.6% @100OC
Melting Point:	620C (1440F) (Heated in closed space)
Heat of Solution:	122 BTU per pound (absorbed)
Viscosity:	Not applicable
Boiling Point:	Not applicable
Flash Point:	None
pH:	9.3(0.1% solution); 9.2(1.0% solution); 9.3(4.7% solution) @ 200C
Formula Weight:	381.37

10 STABILITY AND REACTIVITY

General: Sodium Tetraborate Decahydrate is a stable product.

Incompatible Materials and Conditions to Avoid: 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

INGESTION (ACUTE ORAL TOXICITY): Low acute oral toxicity; LD50 of Sodium Tetraborate Decahydrate in rats is 4500 to 5000 mg/kg of body weight.

SKIN (ACUTE DERMAL TOXICITY): Low acute dermal toxicity; LD50 of Sodium Tetraborate Decahydrate in rabbits is greater than

10000 mg/kg of body weight. Sodium Tetraborate Decahydrate is not absorbed through intact skin.

PRIMARY SKIN IRRITATION INDEX: 0 (zero). Sodium Tetraborate Decahydrate is non-corrosive.

EYE: Draize test in rabbits produced mild eye irritation effects. Fifty years of occupational exposure history reflects no indication of human eye injury from exposure to Sodium Tetraborate Decahydrate.

NOTE: Sodium Tetraborate Decahydrate is chemically and toxicologically related to Boric Acid; the majority of the borate chronic toxicology studies were conducted using Boric Acid. Sodium Tetraborate Decahydrate is converted to Boric Acid in biological systems. The Boric Acid data discussed in this section can be converted to Sodium Tetraborate Decahydrate equivalent data by dividing by a factor of 0.6486.

INHALATION: Human epidemiological studies show no increase in pulmonary disease in occupational populations with chronic exposures to Boric Acid dust and Sodium Borate dust.

CARCINOGENICITY: A Technical Report issued by the National Toxicology Program showed "no evidence of carcinogenicity" from a full 2-year bioassay on Boric Acid in mice at feed doses of 2500 and 5000 ppm in the diet. No mutagenic activity was observed for Boric Acid in a recent battery of four short-term mutagenicity assays.

REPRODUCTIVE/DEVELOPMENTAL TOXICITY: Animal studies indicate Sodium Tetraborate Decahydrate reduces or inhibits sperm production, causes testicular atrophy, and, when given to pregnant animals during gestation, may cause developmental changes. These feed studies were conducted under chronic exposure conditions leading to doses many times in excess of those that could occur through inhalation of dust in occupational settings.

Reproductive Toxicity (Fertility): Dietary Boric Acid levels of 6,700 ppm in chronic feeding studies in rats and dogs produced testicular atrophy, while dogs and rats receiving 2000 ppm did not develop testicular changes 1Weir, Fisher, 1972. In chronic feeding studies of mice on diets containing 5000 ppm (550 mg/kg/d) Boric Acid, testicular atrophy was present, while mice fed 2500 ppm (275 mg/kg/d) Boric Acid showed no significant increase in testicular atrophy 2NTP, 1987. In another Boric Acid chronic study, in mice given 4500 ppm (636 mg/kg/d), degeneration of seminiferous tubules was present together with a reduction of germ cells, while at 1000 ppm (152 mg/kg/d) no effect was seen 3Fail et al., 1991. In a reproduction study on rats, 2000 ppm of dietary Boric Acid had no adverse effect on lactation, litter size, weight and appearance 1Weir, Fisher,

1972. In a continuous breeding study in mice there was a reduction in fertility rates for males receiving 4500 ppm (636 mg/kg/d) Boric Acid, but not for females receiving 4500 ppm Boric Acid SFail et al., 1991.

Developmental Toxicity: Boric Acid at dietary levels of 1000 ppm (78 mg/kg/d) administered to pregnant female rats throughout gestation caused a slight reduction in fetal weight, but was considered to be close to the NOAEL. Doses of 2000 ppm (163 mg/kg/d) and above caused fetal malformations and maternal toxicity. In mice the no effect level for fetal weight reduction and maternal toxicity was 1000 ppm (248 mg/kg/d) Boric Acid. Fetal weight loss was noted at dietary Boric Acid levels of 2000 ppm (452 mg/kg/d) and above. Malformations (agenesis or shortening of the thirteenth rib) were seen at 4000 ppm (1003 mg/kg/d), 4Heindel et al., 1992.

1 Weir, R.J. and Fisher, R.S., Toxicol. Appl. Pharmacol., 23:351-364 (1972)
2 National Toxicology Program (NTP) - Technical Report Series No. TR324, NIH Publ. No. 88-2580 (1987), PB88-213475/XAB
3 Fail et al., Fund. Appl. Toxicol. 17, 225-239 (1991)
4 Heindel et al., Fund. Appl. Toxicol. 18, 266-277 (1992)

12 ECOLOGICAL INFORMATIONECOTOXICITY DATA:

Phytotoxicity: Although boron is an essential micronutrient for healthy growth of plants, it can be harmful to boron-sensitive plants in higher quantities. Plants and trees can easily be exposed by root absorption to toxic levels of boron in the form of water-soluble borate leached into nearby soil or waters. Care should be taken to minimize the amount of borate product released to the environment.

Fish Toxicity: Boron naturally occurs in seawater at an average concentration of 5 mg B/liter. In laboratory studies the acute toxicity (96-hr LC50) for under-yearling Coho salmon (Onchorhynchus kisutch) in seawater was determined as 40 mg B/L (added as sodium metaborate).

Boron concentrations in fresh surface waters are generally less than 1 mg B/L. Laboratory studies on the toxicity of freshwater fish were determined using early life (embryo-larval) stages in natural water and Boric Acid as a test substance. The results were:

Rainbow trout (S. gairdneri)
24-day LC50=150.0 mg B/L
36-day NOEC-LOEC=0.75-1 mg B/L
Goldfish (Carassius auratus)
7-day NOEC-LOEC=26.50 mg B/L
3-day LC50=178 mg B/L

Invertebrate Toxicity: The acute toxicity (48-hour LC50) to Daphnids (Daphnia magna Straus) in natural water is reported to be 133 mg B/L (added as Boric Acid). Estimated chronic toxicity (21-day NOEC-LOEC) values of 6-13 mg B/L (added as Boric Acid) have also been reported.

ENVIRONMENTAL FATE DATA:

Persistence/Degradation: Boron is naturally occurring and ubiquitous in the environment. Sodium Tetraborate Decahydrate decomposes in the environment to natural borate.

Soil Mobility: The product is soluble in water and is leachable through normal soil.

NOTE: Boron (B) is the element in Sodium Tetraborate Decahydrate which is used to characterize borate product ecological effects. To convert Sodium Tetraborate Decahydrate data to Boron (B), multiply by 0.1134.

13 DISPOSAL CONSIDERATIONS

Disposal Guidance: Small quantities of Sodium Tetraborate Decahydrate can usually be disposed of at Municipal Landfill sites. No special disposal treatment is required, but refer to state and local regulations for applicable site-specific requirements. Tonnage quantities of product are not recommended to be sent to landfills. Such product should, if possible, be re-used for an appropriate application.

RCRA (40 CFR 261): Sodium Tetraborate Decahydrate is not listed under any sections of the Federal Resource Conservation and Recovery Act (RCRA).

California Hazardous Waste Designation: California identifies substances with acute LD50's less than 5000 mg/kg as "hazardous wastes". Sodium Tetraborate Decahydrate is therefore a "hazardous waste" if spilled in California, and should be handled in accordance with applicable state regulations.
Refer to Section 15 for additional regulatory information.

14 TRANSPORT INFORMATION

DOT Hazardous Material Classification: Sodium Tetraborate Decahydrate is not a U.S. Department of Transportation (DOT) Hazardous Material.

DOT Hazardous Substances Classification: Sodium Tetraborate Decahydrate is not a DOT Hazardous Substance.

International Transportation: Sodium Tetraborate Decahydrate has no U.N. Number, and is not regulated under international rail, highway, water or air transport regulations.

15 REGULATORY INFORMATION

TSCA No.: Sodium Tetraborate Decahydrate appears on the EPA TSCA inventory list under the CAS No. 1303-96-4.

RCRA: Sodium Tetraborate Decahydrate is not listed as a hazardous waste under any sections of the Resource Conservation and Recovery Act or regulations (40 CFR 261 et seq.).

Superfund: CERCLA/SARA. Sodium Tetraborate Decahydrate is not listed under CERCLA (the Comprehensive Environmental Response Compensation and Liability Act) or its 1986 amendments, SARA, (the Superfund Amendments and Reauthorization Act), 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: Sodium Tetraborate Decahydrate 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.

Clean Water Act (Federal Water Pollution Control Act): 33 USC 1251 et seq.

(a) Sodium Tetraborate Decahydrate 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.

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.

IARC: The International Agency for Research on Cancer (of the World Health Organization) does not list or categorize Sodium Tetraborate Decahydrate as a carcinogen.

NTP Annual Report on Carcinogens: Sodium Tetraborate Decahydrate is not listed.

OSHA Carcinogen: Sodium Tetraborate Decahydrate is not listed.

California Proposition 65: Sodium Tetraborate Decahydrate is not listed on any Proposition 65 lists of carcinogens or reproductive toxicants.

Federal Food, Drug and Cosmetic Act: Pursuant to 21 CFR 175.105, 176.180 and 181.30, Sodium Tetraborate Decahydrate is approved by the FDA for use in adhesive components of packaging materials, as a component of paper coatings on such materials, or for use in the manufacture thereof, which materials are expected to come in contact with dry food products.

CONEG Model Legislation: Sodium Tetraborate Decahydrate meets all the CONEG requirements relating to heavy metal limitations on components of packaging materials.

Clean Air Act: Sodium Tetraborate Decahydrate was not manufactured with and does not contain any Class I or Class II ozone depleting substances, as defined by EPA.

16 OTHER INFORMATION

Product Label Text Hazard Information:

Technical /S.Q. grades:

REPORT NUMBER: 971
MSDS NO: BX1911
EFFECTIVE DATE: 09/29/93

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

VERSION: 00

PRODUCT: BORAX

ORDER NO:
PROD NO :

FOR ADDITIONAL INFORMATION

CONTACT: MSDS COORDINATOR VW&R SPOKANE
DURING BUSINESS HOURS, PACIFIC TIME (206)999-3400

03/15/94 10:32 PRODUCT: CUST NO: ORDER NO:

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

10-0340
Rec'd 3-18-94

To Marilyn	# of pages ▸ 7
Co. Rochelle	From Nancy Power
Dept.	Co. Rhone Poulenc
Fax # 213-655-3070	Phone # Fax # 908-297-9361

MATERIAL SAFETY DATA S

RHONE-POULENC PRODUCT
CATECHOL

PRODUCT CODE(S)
124 S2832924-GM
2832943

RHONE-POULENC INC.
CN 5266
Princeton, NJ 08543-5266
(908) 297-0100

Emergency Phone Number (24 Hours)
CHEMTREC 800-424-9300

Date Prepared
12/19/91

Supercedes
11/7/88
MSDS Number
00616-26.ORG

Section 1. PRODUCT IDENTIFICATION

Synonym(s): 1,2-Benzenediol; pyrocatechol; o-dihydroxybenzene

Chemical Name(s) of Primary Component(s)	CAS Number(s)	Chemical Formula
Catechol	120-80-9	$C_6H_6O_2$

Section 2. INGREDIENTS/SUMMARY OF HAZARDS

Ingredient(s)	CAS Number(s)	OSHA Hazardous (H)/ Non-Hazardous (NH)	Percent
Catechol	120-80-9	H	>98
Hydroquinone	123-31-9	H	trace

SARA Title III Hazard Classification:
(X) Immediate (Acute) Health Hazard
( ) Delayed (Chronic) Health Hazard
( ) Fire Hazard
( ) Sudden Release of Pressure Hazard
( ) Reactive Hazard

WARNING STATEMENTS:

TOXIC BY INHALATION, INGESTION AND SKIN ABSORPTION. SEVERE EYE AND SKIN IRRITANT. SENSITIZER. TARGET ORGANS: LIVER, KIDNEY AND CENTRAL NERVOUS SYSTEM. SEVERE DUST EXPLOSION RISK.

Section 3. PHYSICAL DATA

Melting Point (°F):	219
Boiling Point (°F):	464 (decomposes about 473)
Vapor Pressure (mmHg):	0.08 @ 35°C; 1 @ 75°C
Vapor Density (air = 1):	3.8
Solubility in Water:	Soluble (45 g/100 g)
Specific Gravity:	1.34
Evaporation Rate (butyl acetate = 1):	Not applicable
% Volatile by Volume:	Less than 1

MATERIAL SAFETY DATA SHEET

RHONE-POULENC PRODUCT NAME(S)
CATECHOL

Section 3. PHYSICAL DATA (continued)

Appearance/Odor: White crystalline solid/faint phenolic odor

pH: 4.0

Section 4. FIRE AND EXPLOSION HAZARD DATA

Flash Point (°F)/Method: 261/TCC

Flammable Limits: LFL 1.97% (vapors) UFL Not available

Extinguishing Media:
(X) Water Fog (X) Foam
(X) Dry Chemical (X) CO_2
( ) Other (specify):

Special Fire Fighting Procedures:
Wear a NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Cool containers exposed to fire with water.

Unusual Fire and Explosion Hazards:
EXPLOSION HAZARD SEVERE for dust in an atmosphere of greater than 5% oxygen. Extreme caution must be taken if conveyor systems are used. Rate of pressure rise: 1009 bar/sec; min. explosive conc.: 15 g/m^3; max. pressure rise: 7.5 atmospheres; min. igntition energy: less than 5 millijoules.

Section 5. REACTIVITY DATA

Stability: ( ) Unstable (X) Stable

Conditions to avoid: Heat and open flame. Dusting conditions.

Incompatibility (materials to avoid):
( ) Water
( ) Reducing agents
(X) Other (specify):
(X) Strong acids
(X) Strong oxidizing materials
Exothermic reaction with oxidizing materials. Hydrogen gas may be released on contact with aluminum.
(X) Strong bases
( ) Combustible materials

Hazardous Decomposition Products or Byproducts:
At decomposition temperatures, phenolic products and oxides of carbon are emitted.

Hazardous polymerization: ( ) May occur (X) Will not occur

Conditions to avoid: Not applicable

MATERIAL SAFETY DATA SHEET

RHONE-POULENC PRODUCT NAME(S)
CATECHOL

Section 6. HEALTH HAZARD DATA/FIRST AID PROCEDURES

EXPOSURE LIMITS IN AIR

Chemical Name(s)	ACGIH (TWA)	OSHA (TWA)	OTHER
Catechol	5 ppm (23 mg/m³)	5 ppm (20 mg/m³)	

EFFECTS OF SINGLE OVEREXPOSURE

Symptoms of over-exposure by any route: convulsions, increased blood pressure, paleness, weakness, sweating, headache, ringing of ears, shock, cyanosis, excitement, frothing of nose and mouth, dark-colored urine, death. Target organs: Liver, kidney, skin and central nervous system.

Swallowing: TOXIC BY MOUTH. Acute oral LD50: 260 mg/kg (rat and mouse); 210 mg/kg (guinea pig). (1)

Skin Absorption: TOXIC BY SKIN ABSORPTION. Rapidly absorbed through skin. Acute dermal LD50: 800 mg/kg (rabbit). (1)

Inhalation: TOXIC BY INHALATION. Respiratory tract irritant. Can cause death, apparently from respiratory failure.

Skin Contact: Though mildly irritating initially, catechol may cause eczematous dermatitis, burns and allergenic skin reactions. It is very irritating to rabbit skin. (2)

Eye Contact: EXTREMELY IRRITATING. Can cause phenol-like burns and irreversible eye damage. Extreme irritant in rabbit eyes. (2)

EFFECTS OF REPEATED OVEREXPOSURE:
See above.

CARCINOGENICITY:
This product does not contain any ingredient designated by IARC, NTP, ACGIH or OSHA as a probable human carcinogen.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO MAN:
No mutagenic effects were observed in tests on Salmonella typhimurium. (5)

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:
Central nervous system, liver and kidney problems; respiratory and skin disease.

FIRST AID PROCEDURES

EYES: IMMEDIATELY, flush eye and surrounding skin with a large volume of water using an eye-wash fountain for at least 15 minutes. Thoroughly rinse under lids. GET IMMEDIATE MEDICAL ATTENTION, PREFERABLY AN EYE DOCTOR.

SKIN: IMMEDIATELY, wash with a large volume of water and soap for at least 15 minutes. Remove contaminated clothes and shoes under shower. SEE NOTE TO PHYSICIAN FOR FURTHER FIRST AID. GET IMMEDIATE MEDICAL ATTENTION.

MATERIAL SAFETY DATA SHEET

RHONE-POULENC PRODUCT NAME(S)
CATECHOL

Section 6. HEALTH HAZARD DATA/FIRST AID PROCEDURES (continued)

FIRST AID PROCEDURES (continued)

INGESTION:
GET IMMEDIATE MEDICAL ATTENTION. SEE NOTE TO PHYSICIAN. If conscious, give a slurry of activated charcoal in water. Do not give an emetic.

NOTE TO PHYSICIAN:
This material is highly toxic by inhalation and toxic by skin absorption and ingestion. It produces central nervous system problems that manifest themselves by such symptoms as motor weakness, increased respiration, tremors, and convulsions. It is also a strong irritant and can cause phenol-like burns.

EYES
Flush eye and surrounding skin with a large volume of water. Treat as for phenol burns. Consult an ophthalmologist.

SKIN
Immediately, wash all exposed skin with a large volume of water or isopropyl alcohol. Treat as for phenol burns. We have used the following PVP Treatment successfully to minimize the effects of skin contact with and to reduce absorption through the skin of phenol-like materials. This recommendation is based on the ability of PVP to strongly complex phenol compounds and anecdotal reports of its effectiveness in treating phenol burns. (3) For a discussion of an alternative treatment using polyethylene glycol see reference (4).

PVP (polyvinylpyrrolidone) Treatment. Either apply directly a water paste of PVP or neutralizing solution of 40 grams PVP, 1/2 gallon water and 1/2 gallon isopropyl alcohol.

For contact over 10% of body, treat by removing clothes and shoes under a shower and then wrapping in PVP-soaked towels. Transport to hospital for observation and further treatment.

Keep a supply of PVP solution on hand. PVP is manufactured by GAF Corporation, Chemical Division.

INGESTION (4)
If conscious, give a slurry of activated charcoal in water if not previously administrated. Then perform gastric lavage with water. DO NOT USE ALCOHOL. The use of a stomach tube may be contraindicated if corrosion is evident.

Administer milk, egg albumin, egg white, or olive oil as demulcents. Maintain victim in recumbent position. Apply external heat to keep warm. Keep victim quiet. Give fluids to restore electrolyte balance. Morphine may be given for pain. Treat shock if indicated. Stimulants PRN, especially for CV embarrassment. Treat liver and kidney damage if indicated. Give antibiotics, oxygen and artificial respiration if indicated.

INHALATION
Give oxygen therapy. If breathing stopped, give artificial respiration. Treat symptomatically as for phenol inhalation.

MATERIAL SAFETY DATA SHEET

RHONE-POULENC PRODUCT NAME(S)
CATECHOL

Section 7. PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:
Isolate area. Wear appropriate protective gear. Sweep up into plastic drum. Avoid creating dusting conditions. Ventilate area. Clean up residue with a 2-5% solution of soda ash.

WASTE DISPOSAL METHOD:
Dispose of in accordance with Local, State and Federal regulations.

Aquatic minimum toxic concentration: 4 mg/l (daphnia); 5 mg/l (fish)

HANDLING AND STORAGE:
TOXIC BY INHALATION, INGESTION AND SKIN ABSORPTION. EXTREMELY IRRITATING TO SKIN, EYES. Store in a cool, dry place in tightly closed containers. Avoid direct exposure to sun. Product will tend to darken in storage. Caking may occur in warm damp storage areas. Do not use compressed air to transfer product. Product should be handled in a closed building or tank equipped with alkali scrubber. Do not store in aluminum.

Catechol vaporizes and sublimes readily. Avoid breathing dusts, mists or vapors. Avoid direct exposure with skin and eyes. Wash hands thoroughly after handling. Do not rub eyes with soiled hands. Do not eat, drink or smoke in the work area. Avoid plastic materials like polystyrene.

OTHER PRECAUTIONS:
THIS PRODUCT PRESENTS A SEVERE DUST EXPLOSION HAZARD.
It is recommended that all dust control equipment and material transport systems involved in handling of this product contain explosion relief vents or explosion suppression systems or an oxygen deficient environment. In addition, all conductive elements of the system that contact this material should be electrically bonded and grounded. This powder should not be flowed through non-conductive ducts or pipes. Use on appropriately classed electrical equipment.

Runoff from fire control may cause pollution. Good industrial hygiene practice recommends that engineering controls be used to reduce environmental concentrations to the permissible levels.

Use specially designed piping to prevent splashing or spurting while handling the molten product.

Section 8. CONTROL MEASURES AND WORKER PROTECTION INFORMATION

Respiratory Protection (specify type):
Use a NIOSH/MSHA approved air purifying respirator with appropriate dust or vapor cartridge for phenol-like compounds.

Ventilation:
Provide adequate ventilation. Use local exhaust. Aspirate dusts and vapors at point of emission.

Protective Clothing:
Wear chemical resistant work uniform, rubber gloves and boots, and a face mask with GMC cartridge.

MATERIAL SAFETY DATA SHEET

RHONE-POULENC PRODUCT NAME(S)
CATECHOL

Section 8. CONTROL MEASURES AND WORKER PROTECTION INFORMATION (continued)

Eye Protection:
( ) Safety Glasses with Side Shields
( ) Chemical Workers Goggles
(X) Gas-tight Goggles or Equivalent
(X) Other (specify): DO NOT WEAR CONTACT LENSES. Use a face shield.

Other Protective Equipment:
Maintain a sink, safety shower, eyewash fountain, oxygen and PVP solution (see NOTE TO PHYSICIAN) in the work area.

Section 9. REGULATORY STATUS

TSCA Inventory Status: Product is listed on the TSCA Inventory.

Transportation Status: POISONOUS SOLID n.o.s. Class 6.1 UN 2811, Pkg. Group III.

Reportable Quantity (RQ), under U.S. EPA CERCLA: 1 lb.

Specifically Listed under SARA Title III:
( ) Section 302 Extremely Hazardous Substances
(X) Section 313 Toxic Chemicals
( ) Not listed

State/International Right-to-Know Regulations:

California:	Not listed
Connecticut:	Hazardous Materials Survey
Florida:	RTK
Illinois:	Toxic Substance
Louisiana:	RTK Spill RQ 1 lb.
Massachusetts:	RTK
New Jersey:	RTK ID# 0722; Env; Spill tax
New York:	Not listed
Pennsylvania:	RTK
Rhode Island:	Hazard: toxic
Canada:	Conc. 1%; No. 319

Section 10. REFERENCES

(1) RTEC (7/88).
(2) Am. Ind. Hyg. Ass. J37:596-606 (1976).
(3) Handbook of Water Soluble Gums and Resins, Chapter 21, Polyvinylpyrrolidone, McGraw Hill (1980).
(4) Clinical Toxicology of Commercial Products (5th), Gosselin, et al, pp. III-344 to 348 (1984).
(5) Unpublished Rhone-Poulenc sponsored toxicity study.

The information herein is given in good faith but no warranty, expressed or implied, is made.

PFALTZ & BAUER, INC.

P11180

172 EAST AURORA ST. (203) 574-0075
WATERBURY, CT 06708

10-0890

MATERIAL SAFETY DATA SHEET

CHEMTREC 1-800-424-9300

MATERIAL IDENTIFICATION

p-Phenylenediamine

MSDS NUMBER : P11180

Revision Date : 10-Apr-91
Date Printed : 17-May-91

GRADE : TECHNICAL
CHEMICAL FAMILY : AROMATIC AMINE

TRADE NAMES / SYNONYMS
PPD
p-Diaminobenzene

CAS NAME : 1,4-BENZENEDIAMINE
CAS NUMBER : 106-50-3
FORMULA : C6H4(NH2)2
MOLECULAR WEIGHT : 108.14
TSCA INVENTORY STATUS : Reported/Included
NPCA-HMIS RATINGS : Health: 2 Flammability: 1 Reactivity: 1
Personal Protection rating to be supplied by user depending on use conditions.

COMPONENTS

Material	CAS Number	%
*p-PHENYLENEDIAMINE	106-50-3	99.5
ANILINE	62-53-3	<.01

* Regulated as a Toxic Chemical under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

PHYSICAL DATA

Boiling Point	: 271 deg C (520 deg F) at 760 mm Hg.
Vapor Pressure	: 0.0038 mm Hg at 25 deg C (77 deg F)
	: 1.0797 mm Hg at 100 deg C (212 deg F)
Vapor Density	: 3.7 (Air = 1.0).
Melting Point	: 141 deg C (286 deg F)
Evaporation Rate	: (Butyl Acetate = 1.0) Less than 1
Water Solubility	: 10 WT % at 40 deg C (104 deg F) 86.6 WT % at 107 deg C (225 deg F)
pH	: 9.45 (Water extract)
Odor	: Slight aromatic
Form	: Solid (flakes); Liquid (molten)
Color	: Light pink to tan (darkens on storage)
Specific Gravity	: 1.04 at 160 deg C (320 deg F)

HAZARDOUS REACTIVITY

Instability	: Stable at normal temperatures and storage conditions. Moist air and excessive heat may cause product quality to degrade.
Incompatibility	: Incompatible with oxidizing agents.
Decomposition	: Decomposes to carbon monoxide and nitrogen oxides if overheated.
Polymerization	: Polymerization will not occur.

FIRE AND EXPLOSION DATA

Flash Point	: 154 deg C (309 deg F)
Method	: TCC
Autoignition	: Not available
Autodecomposition	: Not available

Flammable Limits in Air, % by Volume

LEL: Minimum Ignitable Concentration (Dust in Air) = 0.025 g/L

UEL: Not available

FIRE AND EXPLOSION HAZARDS

OSHA Class IIIB Combustible Material; follow appropriate National Fire Protection Association (NFPA) codes for handling and storage facilities. Dust can form explosive mixtures in air. Hazardous carbon monoxide and nitrogen oxides may be produced in a fire.

EXTINGUISHING MEDIA

Small Fires: Dry chemical, carbon dioxide (CO2).

Large Fires: Water spray, fog, or foam.

SPECIAL FIRE FIGHTING INSTRUCTIONS

Isolate hazard and evacuate area. Stay upwind and avoid smoke and fumes. Use water spray to cool tanks and reduce vapors. CAUTION: Contact between water and molten material may cause spattering. If smoke and fumes cannot be avoided, wear full protective clothing with hood and breathing air supply. Runoff from fire control may cause pollution.

HEALTH HAZARD INFORMATION

Harmful to liver or kidneys if inhaled, swallowed, or absorbed through skin. Causes eye, skin, nose, and throat irritation. May cause allergic skin or lung reactions.

ANIMAL DATA:

Inhalation 4-hour LC50	:	0.92 mg/L (aerosol) in rats
Skin Absorption ALD	:	5000 mg/kg in rabbits
Oral LD50	:	80 mg/kg in rats

The compound is a moderate eye irritant, a mild skin irritant, and a skin sensitizer in tests with laboratory animals. Toxic effects described in animals from single, near-lethal, inhalation exposures include weight loss, diarrhea, incoordination, and cyanosis. When exposed repeatedly, sensitized animals had difficulty in breathing. By ingestion, animals receiving single, high doses showed decreased activity and general malaise. Repeated ingestion exposures caused liver and kidney damage, and irritation of the gastrointestinal tract.

Tests in animals demonstrate no carcinogenic activity, developmental toxicity, or genetic damage. It does produce genetic damage in bacterial and mammalian cell cultures. It does not produce heritable genetic damage. Tests for reproductive effects have not been performed.

HUMAN HEALTH EFFECTS:

Human health effects of overexposure by skin contact include skin irritation with discomfort or rash. In susceptible individuals, the compound may cause skin sensitization with allergic skin rashes. Effects of overexposure by eye contact may include eye irritation with discomfort, tearing, or blurring of vision. By inhalation, effects may include nonspecific discomfort such as nausea, headache, or weakness; irritation of the upper respiratory passages including runny nose or cough; asthma-like reactions with shortness of breath, wheezing, or cough, possibly occurring on subsequent reexposure to concentrations below established exposure limits. By ingestion, effects may include nonspecific discomfort such as nausea, headache, or

weakness. Ingesting large amounts of p-phenylenediamine has been reported to cause vomiting and visible swelling of the face and neck. In severe cases, the inside of the throat can swell enough to make breathing difficult.

Animal data suggest higher or repeated exposures may cause abnormal liver or kidney function, as detected by laboratory tests, or gastrointestinal tract irritation.

Individuals with preexisting diseases of the skin, liver, kidneys, or lungs may have increased susceptibility to the toxicity of excessive exposures.

CARCINOGENICITY

None of the components in this material is listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.

EXPOSURE LIMITS

p-Phenylenediamine

AEL *		: 0.1 mg/m3 - 8 Hr. TWA - Skin
TLV	(ACGIH)	: 0.1 mg/m3 - 8 Hr TWA See Notice of Intended Changes (1990-91) Delete skin notation. - Skin
PEL	(OSHA)	: 0.1 mg/m3 - 8 Hr TWA - Skin
Other		: *SEE ADDITIONAL INFORMATION SECTION FOR A DEFINITION OF THE "SKIN" NOTATION

OTHER APPLICABLE EXPOSURE LIMITS

ANILINE

AEL *		: 2 ppm, 8 & 12 Hr. TWA - Skin
TLV	(ACGIH)	: 2 ppm, 7.6 mg/m3 - 8 Hr TWA (and homologues) - Skin
PEL	(OSHA)	: 2 ppm, 8 mg/m3 - 8 Hr TWA (and homologues) - Skin

* AEL is Acceptable Exposure Limit.

SAFETY PRECAUTIONS

Do not get in eyes, on skin, or on clothing. Do not breathe dust or vapor. Wash thoroughly after handling.

FIRST AID

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, immediately wash skin with soap and

water. Wash contaminated clothing before reuse. Call a physician. If molten material gets on skin, cool rapidly with cold water. Do not attempt to peel material from skin. Obtain medical treatment for thermal burns.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, do not induce vomiting. Immediately give two glasses of water or activated charcoal slurry. Never give anything by mouth to an unconscious person. Call a physician.

NOTES TO PHYSICIAN

To prepare activated charcoal slurry, suspend 50 gm of activated charcoal in 400 mL of water and shake well. Give 5 mL/kg of body weight, or 350 mL for an average adult.

Severe overexposure may cause facial, pharyngeal, and occasionally, laryngeal edema. Death may be rapid due to acute respiratory distress. Less severe cases have responded to corticosteroids and antihistamines; more severe cases have required tracheostomy.

PROTECTION INFORMATION

GENERALLY APPLICABLE CONTROL MEASURES AND PRECAUTIONS

Good general ventilation should be provided to keep dust and vapor concentrations below the exposure limit and prevent the formation of explosive dust mixtures in air.

PERSONAL PROTECTIVE EQUIPMENT

Have available and use as appropriate:

EYE/FACE PROTECTION: Wear safety glasses (side shields preferred) or coverall chemical splash goggles. Additionally, wear a full-length face shield where the possibility exists for face contact due to splashing or spraying of material.

RESPIRATORS : A NIOSH/MSHA approved air purifying respirator with a high efficiency dust filter (HEPA) and organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is

limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, when exposure levels are not known, or in any other circumstances where air purifying respirators may not provide adequate protection.

PROTECTIVE CLOTHING: Where there is potential for skin contact, have available and wear as appropriate: butyl or neoprene gloves; butyl apron, pants, jacket, hood, and boots; or totally encapsulating chemical suit with breathing air supply. Where there is potential for contact with hot/molten material, wear heat resistant clothing.

DISPOSAL INFORMATION

AQUATIC TOXICITY

The compound is moderately to extremely toxic. 96-hour LC50 in fathead minnows is 0.028 mg/L. 96-hour LC50 in rainbow trout is 3.9 mg/L.

SPILL, LEAK, OR RELEASE

NOTE: Review FIRE AND EXPLOSION HAZARDS and SAFETY PRECAUTIONS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up.

Evacuate area and keep upwind of spill. If molten, contain spill with sand or earth dam. Allow to solidify and transfer to a covered metal container for disposal. Avoid causing dust. Flush area with detergent and water. Water spray may be used to control and disperse vapors. Comply with Federal, State, and local regulations on reporting releases. The CERCLA Reportable Quantity for this product is 1 lb.

WASTE DISPOSAL

Comply with Federal, State, and local regulations. If approved, may be incinerated, sent to an approved hazardous material disposal area, or transferred to a licensed disposal contractor.

SHIPPING INFORMATION

DOT

Proper Shipping Name	: PHENYLENEDIAMINE, PARA, SOLID *
Hazard Class	: ORM-A
UN/NA No.	: UN 1673
Special Information	: *REG. AS HAZARDOUS MATERIAL BY DOT ONLY WHEN SHIPPED BY AIR.

DOT/IMO

Proper Shipping Name	: PHENYLENEDIAMINES
Hazard Class	: POISON B, 6.1
UN No.	: 1673
DOT/IMO Label	: ST. ANDREW'S CROSS
Special Information	: FLASH POINT: 154 DEG C (309 DEG F)
Packaging Group	: III

Shipping Containers

- Tank Car - (Molten)
- Tank Truck - (Molten)
- Fiber Drums - (Flakes)

STORAGE CONDITIONS

Store inside in a cool, dry, well-ventilated area away from heat, sparks, and flame. Do not store with strong oxidizing materials. Keep containers upright and tightly closed.

TITLE III HAZARD CLASSIFICATIONS

Acute	: Yes
Chronic	: Yes
Fire	: No
Reactivity	: No
Pressure	: No

LISTS:

Extremely Hazardous Substance	-No
CERCLA Hazardous Substance	-Yes
Toxic Chemical	-Yes

CANADIAN WHMIS CLASSIFICATION

D-1B; D-2B

ADDITIONAL INFORMATION AND REFERENCES

Warning: This product contains a trace substance (aniline) known to the State of California to cause cancer.

*INFORMATION CONTINUED FROM OTHER EXPOSURE LIMITS

The "Skin" notation indicates that the compound is capable of penetrating skin and mucous membranes. Therefore, control of vapor inhalation alone may not be sufficient to prevent an excessive dose; skin contact should be avoided.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

PHOTOGRAPHERS FORMULARY
PO BOX 5105
MISSOULA, MT 59806

10-1310

FED. STD. NO. 313

MATERIAL SAFETY DATA SHEET

Form Approved
Bureau Budget No. 45-R0338

SECTION I

MANUFACTURER'S NAME AND FSCM (Federal Supply Code for Manufacturers): FMC Corporation 6810

EMERGENCY PHONE NO.: 201/541-4171

ADDRESS (Number, Street, City, State, and Zip Code): 500 Roosevelt Avenue, Carteret, N. J. 07008

CHEMICAL NAME AND SYNONYMS: Trisodium Phosphate

TRADE NAME AND SYNONYMS: TSP, Trisodium

CHEMICAL FAMILY: Phosphates

FORMULA: Na_3PO_4

FEDERAL STOCK NUMBER (FSN):

GROSS WEIGHT (LBS):

OUTSIDE PACKAGE DIMENSIONS (Inches):

MIL-STD-1341/NATIONAL FIRE PROTECTION ASSOCIATION STD 704M SIGNAL

FLAMMABILITY 0 HEALTH 0 REACTIVITY 0 SPECIFIC HAZARD --

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, AND SOLVENTS	%	THRESHOLD LIMIT VALUE (Units)	ALLOYS AND METALLIC COATINGS	%	THRESHOLD LIMIT VALUE (Units)
PIGMENTS		NA	BASE METAL		NA
CATALYST		NA	ALLOYS		NA
VEHICLE		NA	METALLIC COATINGS		NA
SOLVENTS		NA	FILLER METAL PLUS COATING OR CORE FLUX		NA
ADDITIVES		NA	OTHERS		NA
OTHERS		NA			

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, or GASES	%	THRESHOLD LIMIT VALUE (Units)
NA		

SECTION III - PHYSICAL DATA

BOILING POINT (°F)	--	SPECIFIC GRAVITY (H_2O = 1)	2.537
VAPOR PRESSURE (mmHg.)	NA	PERCENT VOLATILE BY VOLUME (%)	NA
VAPOR DENSITY (AIR=1)	NA	EVAPORATION RATE (_____ = 1)	0
SOLUBILITY IN WATER	Appreciable		

APPEARANCE AND ODOR: White granular powder solid - odorless.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method Used)	FLAMMABLE LIMITS	LOWER EXPLOSIVE LIMIT	UPPER EXPLOSIVE UNIT
Non-flammable		Non-flammable	

EXTINGUISHING MEDIA: NA

SPECIAL FIRE FIGHTING PROCEDURES: NA

UNUSUAL FIRE AND EXPLOSION HAZARDS: NA

DD FORM 1813
1 JUN 71

FIGURE 8

SECTION HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
Unknown

EFFECTS OF OVEREXPOSURE
Moderate toxicity - strong irritant to eyes.

EMERGENCY AND FIRST AID PROCEDURES
Eyes - wash with copious amount of water - call physician.

Skin - flush with excessive amount of water.

Inhalation - remove from exposure.

SECTION VI REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		Slippery when wet. P^H 11.2
	STABLE	X	

INCOMPATABILITY (Materials to Avoid)
Strong mineral acids.

HAZARDOUS DECOMPOSITION PRODUCTS
None

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
For minor spills the material should be swept up and discarded in the general dump. Residue can be washed away with water

WASTE DISPOSAL METHOD
Flush to sewer with excessive amount of water.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
U.S. Bureau of Mines approved toxic dust mask.

VENTILATION	LOCAL EXHAUST	SPECIAL
No	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES General purpose non-absorbant material

EYE PROTECTION
Chemical type goggles.

OTHER PROTECTIVE EQUIPMENT
Full cover clothing.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Store in dry area.

OTHER PRECAUTIONS

SECTION X TRANS. DATA

PROPER SHIPPING (Article) NAME
Trisodium phosphate

DOT CLASSIFICATION
Not required

DOT LABEL	DOT MARKING	EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES
None	None	No special precautions

DOT PLACARD	PRECAUTIONS TO BE TAKEN IN TRANSPORTATION
None	Keep dry.

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