

SECTION H
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SECONDARY DIRECT FOOD ADDITIVE PETITION - POULTRY

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000495

01F-0142

EA 1

ENVIRONMENTAL ASSESSMENT FOR PROPOSED

FDA REGULATED PRODUCT

KX-6145

December 14, 2000

**Ecolab, Inc.
370 Wabasha St. North
St. Paul, MN 55102**

000496

1. DATE: December 14, 2000

2. NAME OF PETITIONER: Ecolab Inc.

3. ADDRESS: 370 Wabasha St. North
St. Paul, MN 55102

4. DESCRIPTION OF PROPOSED ACTION

a.) Requested approval: This petition requests that FDA amend 21 CFR 173 by allowing for the use of an aqueous antimicrobial solution (KX-6145) consisting of hydrogen peroxide, acetic acid, peroxyacetic acid, octanoic acid, peroxyoctanoic acid, and 1-hydroxyethylidene-1, 1-diphosphonic acid (HEDP) as a carcass spray and wash to reduce the surface microbiological content of freshly killed poultry carcasses. This product is applied to the surface of poultry carcasses, poultry carcass parts, or poultry organs. Application of KX-6145 to poultry carcasses, poultry carcass parts, or poultry organs is accomplished through spraying, submersing or both. When the product is diluted to the use concentration (19 ounces of concentrate to 100 gallons of water), it consists of acetic acid (657 ppm), hydrogen peroxide (100 ppm), octanoic acid (52 ppm), peroxyacetic acid (194 ppm), peroxyoctanoic acid (13 ppm) and 1-hydroxyethylidene-1, 1-diphosphonic acid (10 ppm). (Concentrations listed are approximate and vary slightly with age of the product).

b.) Need for action: This product is an antimicrobial solution that is designed to reduce the bacterial count on the surface of freshly killed poultry carcasses. By reducing the bacteria present, this will retard the bacterial degradation of the meat and reduce the content of pathogenic organisms on the surface of the carcass. This will produce a safer food supply and allow the treated meat to have a longer shelf life.

c.) Locations of use/disposal: This product is proposed for use in poultry processing plants. The quantity used will ultimately depend on market penetration, number of carcasses treated and the type of equipment used in the facility.

Spray application of KX-6145 will commonly take place just prior to submersion chilling. A de-feathered, eviscerated carcass hung on a shackle will be carried into a spray cabinet by a conveyor system. Spray nozzles inside the cabinet will apply KX-6145 to the carcass surface to accomplish the technical effect of microbial reduction. The carcass will exit the spray cabinet and be further processed. Carcass parts or organs may also be sprayed with KX-6145.

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Submersion application of carcasses in a chilling bath containing KX-6145 will occur immediately following the spray application step. The chilled bath also contains other carcasses. Adding the KX-6145 to the chiller water accomplishes the technical effect of microbial reduction. Carcasses are moved through the chiller bath by a paddle or auger-type conveyor. The carcass will exit the chiller bath and be further processed. Carcass parts or organs may also be submersion chilled in KX-6145.

After the KX-6145 is sprayed onto the carcass, the majority of the product will drain off the meat and ultimately run into drains and enter the meat processing plant water treatment facility. The KX-6145 in the chiller water will also be disposed of down the drain and enter the meat processing plant water treatment facility. All of this water is then collected and treated by the facility prior to it being sent to a POTW. Very minor quantities are lost to evaporation into the air.

5. IDENTIFICATION OF SUBSTANCES THAT ARE THE SUBJECT OF PROPOSED ACTION

The product will consist of the following chemicals in the approximate percentages listed in Table 1. This represents the finished concentrated KX-6145 formula. The product will undergo significant dilution (approximately 1:628) prior to application to the poultry carcasses.

The only raw materials used in this product are hydrogen peroxide, acetic acid, octanoic acid and 1-hydroxyethylidene-1, 1-diphosphonic acid (HEDP). The peroxyacetic acid and the peroxyoctanoic acid are formed by the reaction of acetic acid with hydrogen peroxide and octanoic acid with hydrogen peroxide, respectively.

000498

Table 1

Chemical Substance % in concentrate	CAS No.	Structure	MW	Physical Form
Hydrogen peroxide, 6.2%	7722-84-1	H-O-O-H	34	Clear liquid
Acetic acid 40.6%	64-19-7	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3 - \text{C} - \text{OH} \end{array}$	60	Clear liquid
Peroxyacetic acid 12.0%	79-21-0	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3 - \text{C} - \text{OOH} \end{array}$	76	Clear liquid
Octanoic acid 3.2%	124-07-2	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3 - (\text{CH}_2)_6 - \text{C} - \text{OH} \end{array}$	144	Light yellow liquid
Peroxyoctanoic acid 0.8%	33734-57-5	$\begin{array}{c} \text{O} \\ \\ \text{CH}_3 - (\text{CH}_2)_6 - \text{C} - \text{OOH} \end{array}$	160	Waxy, white solid
Water 36.6%	7732-18-5	H-O-H	18	Colorless liquid
1-Hydroxyethylidene-1, 1-diphosphonic acid 0.6%	2809-21-4	$\begin{array}{c} \text{OH} \text{ OH} \text{ OH} \\ \quad \quad \\ \text{HO} - \text{P} - \text{C} - \text{P} - \text{OH} \\ \quad \quad \\ \text{O} \quad \text{CH}_3 \quad \text{O} \end{array}$	206	Colorless liquid

6. INTRODUCTION OF SUBSTANCES INTO THE ENVIRONMENT

a. Introduction of substances into the environment as a result of manufacture

Only negligible environmental releases are anticipated during the production of the subject additive. The manufacture of the product involves only mixing of ingredients in a closed system at ambient temperature. Several of the components have vapor pressures capable of producing very small losses to the environment. Only the top surface of the mixture is open to the air, however, each mix tank is equipped with a scrubber eliminating virtually any material escaping from the tank and reaching the environment. With these safeguards in place, the total loss to the atmosphere is insignificant.

The process of manufacture of this product will involve the use of a dedicated tank. This tank will be used to produce consecutive batches and will not be cleaned or washed out between runs. Therefore under normal operating conditions, no loss to the environment is expected via the septic system. If there is required maintenance on the tank, any residual product is rinsed out of the tank and the rinse water is collected in drums, and is not sewered. The rinse water is then

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used as the water component of the next batch produced, thus eliminating any discharge of this material to a publicly owned wastewater treatment plant (POTW).

There are no extraordinary circumstances that pertain to the manufacture of this product. There are no emissions that are expected to result in any harm to the environment, violate any federal, state, or local law or threaten any habitat of an endangered species protected under federal law.

b. Introduction of substances into the environment as a result of use/disposal

Estimates of the quantity produced annually will vary greatly depending on market acceptance, performance, the availability of alternatives and the amount of meat that is treated. It is therefore not possible to give an accurate projection of the amount that will be sold in the future.

However, some estimation of the quantity may be made using past experience and judgement. It is projected that in the first year of production, approximately 10,000 gallons of product will be sold; by the fifth year of production, approximately 200,000 gallons of this product will be used.

The total amount of KX-6145 used at a typical facility can be estimated, although the actual amounts used will vary greatly on the equipment used and the number of birds processed. The concentrate is diluted to the use solution of 200 ppm before it is sprayed on the surface of the poultry. This carcass wash is sprayed continuously as the carcasses pass through the spray cabinet. After spray application, the excess carcass wash drips off the meat and empties into a drain. The amount of KX-6145 solution (at 200 ppm) applied by spray to an individual carcass is approximately 0.25 gallon.

After spraying, the carcass is placed in the chilling bath where the concentration of peracids is approximately 30 ppm. The chiller bath is typically filled once per day. The volume of water used to initially fill the chiller each day is approximately 25,000 gal. Fresh make-up water will be added to the chiller during throughout the day at a rate of about 0.5 gallon / bird. About 200,000 birds receive submersion chilling in a typical day.

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Based on the above information, an estimate of the daily use of KX-6145 in a plant can be calculated.

For spray application

Using 200 ppm peracids (dilution of 0.00186 parts KX-6145 to 1 part water):

200,000 birds x 0.25 gal/bird = 50,000 gallons (at 200 ppm use solution)

50,000 gallons x 0.00186 = 93.0 gallons (KX-6145 concentrate)

For chiller bath application

Using 30 ppm peracids (dilution of 0.00028 parts KX-6145 to 1 part water):

25,000 gallons daily initial chiller bath fill

PLUS

200,000 birds x 0.5 gal/bird = 100,000 gallons

This results in a total chiller bath use of 125,000 gallons (100,000+25,000) per day of 30 ppm peroxyacid use solution.

125,000 gallons x 0.00028 = 35.0 gallons (KX-6145 concentrate)

The total use of KX-6145 concentrate for both the spray and chiller is 128 gallons (93+35) for a typical plant. In this scenario, it is assumed that all of the product used on the carcasses will ultimately reach the drain and be discharged to the on site treatment facility.

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**POTW LOADING OF DISCHARGES FROM POULTRY PROCESSING PLANTS
RESULTING FROM THE USE OF KX-6145 ⁽¹⁾⁽²⁾**

Component	Percentage In Concentrate⁽³⁾	Use Rate (gpd)	Load to 25 Million gpd – POTW (ppb)	Effluent From POTW (ppb) ⁽⁴⁾
Hydrogen Peroxide	6.2	7.9	316	32
Acetic Acid	40.6	52.0	2080	208
Peroxyacetic Acid	12.0	15.4	616	62
Octanoic Acid	3.2	4.1	164	16
Peroxyoctanoic Acid	0.8	1.0	40	4.0
HEDP	0.6	0.8	32	3.2
Water	36.6	46.8	NA	NA
Total Product	100.0	128	5120	512

⁽¹⁾ Assumes that the waste stream is directly sent to a POTW, although this is not the case. In poultry processing facilities, effluents are sent to a pre-treatment facility. Essentially all of the components in this product (except for HEDP) will be degraded before they ever enter a POTW. Therefore, the results of these calculations are a drastic overestimation of the actual environmental releases.

⁽²⁾ Assumes use of 128 gallons/day of KX-6145 per poultry processing facility; assumes a 25 million gal/day POTW Treatment Facility

⁽³⁾ Concentrations are approximate and depend on the age of the product, temperature, dilution, etc.

⁽⁴⁾ Assumes a 90% degradation rate at the POTW

Virtually all of the product is expected to be used in poultry processing. It is not expected that any significant amount of this product will be disposed. In the rare case that it is necessary to discard small amounts of this product, it can be put into the sanitary sewer along with a large amount of water. As long as it is significantly diluted, it will not adversely affect the environment and will degrade in the manner noted above.

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7. FATE OF EMITTED SUBSTANCES

Air Releases

Small amounts of acetic acid and hydrogen peroxide will be emitted into the air. Hydrogen peroxide is not stable in sunlight, and undergoes photolytic decomposition. Both the hydrogen peroxide and acetic acid will be removed from the air by rain. Only small quantities of these chemicals are anticipated to be released into the air and are not expected to result in any adverse environmental effects. The remaining components in the formula are not very volatile and are expected to remain dissolved in the water matrix and enter the drain. These chemicals will enter the water treatment facility.

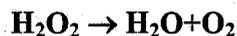
The Occupational Safety & Health Administration (OSHA) has set permissible exposure limits (PEL's) of 10 ppm for acetic acid and 1 ppm for hydrogen peroxide. No PELs exist for the remaining components in the product. Based on the amount sprayed and the proximity of workers to the spray cabinets and chiller baths, industrial hygiene practices such as proper ventilation and personal protective equipment may be necessary. Initial monitoring may be necessary to ensure the ambient levels of these chemicals are below the respective PEL's. See section A7 of this petition for component MSDSs.

Water Releases

This product will be collected in drains at the facility and mixed with other discharges, including waste streams containing organic materials and biological wastes such as blood. Upon contact with these materials, the active ingredients (peroxides) in the carcass wash will rapidly begin to degrade into simple molecules such as acetic acid, water, oxygen, carbon dioxide octanoic acid and aliphatic hydrocarbons. The wastewater goes through several processing steps including dissolved air flotation, anaerobic treatment, activated sludge and chlorination/dechlorination prior to release to the POTW.

Hydrogen peroxide

Hydrogen peroxide will react with organic molecules and also undergo enzymatic degradation via catalase, glutathione peroxidase or other nonspecific peroxidases. Microbial action can also degrade it to water and oxygen.



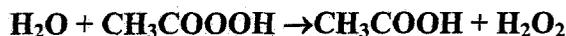
Acetic acid

Acetic acid is not an environmentally hazardous material and may be used as a carbon source for living matter.

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Peroxyacetic acid

Peroxyacetic acid rapidly undergoes degradation by reaction with organic molecules, enzymatic degradation by some peroxidases and is degraded by metal catalysis into hydrogen peroxide and acetic acid.

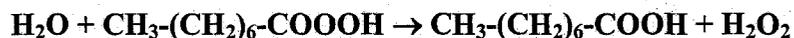


Octanoic acid

Octanoic acid is a medium chain length organic acid. It occurs naturally in living tissues. It can serve as a carbon source. It is essentially non-toxic and is not an environmentally hazardous material.

Peroxyoctanoic acid

Peroxyoctanoic acid will undergo degradation to octanoic acid and hydrogen peroxide by reactions with organic molecules or by the action of some peroxidases into octanoic acid and hydrogen peroxide. The breakdown products are then degraded as described as above.



Summary

As outlined above, all the components in the formula are likely to undergo rapid degradation to simple non-toxic molecules. These reactions take place rapidly due to the chemically unstable nature of the active ingredients. Based on these reactions, only water, oxygen, acetic acid, carbon dioxide, octanoic acid and other hydrocarbons will be released into the environment.

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8. ENVIRONMENTAL EFFECTS OF RELEASED SUBSTANCES

All of the components in this product break down to simple non-toxic molecules. This process will occur long before leaving the waste treatment area of the facility. No adverse environmental effects are expected to result from the use of this material.

Hydrogen peroxide: Decomposes rapidly in water to oxygen and water and is not actually expected to enter the environment, after wastewater treatment.

Acetic acid: As can be seen from the table presented in section 6, potential worst case release to the environment (maximum 132 ppb) is much lower than the reported toxicity values to aquatic organisms. The reported 96-hr fish LC₅₀'s are in the range of 80 ppm allowing a greater than 60-fold safety factor (see section H-2 for available data on the environmental effects of acetic acid).

Peroxyacetic acid: Decomposes rapidly in water to acetic acid and is not actually expected to enter the environment, after wastewater treatment.

Octanoic acid: Rapidly degraded by wastewater treatment micro-organisms (since it is a fatty acid utilized as an energy and carbon source by same) and is not actually expected to enter the environment, after wastewater treatment.

Peroxyoctanoic acid: Decomposes rapidly in water to octanoic acid and is not actually expected to enter the environment, after wastewater treatment.

Hydroxyethylene diphosphonic acid (HEDP): Data on HEDP are available from the suppliers (see MSDS for HEDP in Appendix 1) and are summarized here. The data indicate that HEDP is practically non-toxic to many aquatic and avian organisms however, it is "slightly toxic" to oysters (EC₅₀ between 10 and 100 ppm on EPA's standard rating scale for toxicity to aquatic organisms). As noted above, the potential release levels of this substance to the environment are well below the EC₅₀, being on the order of 1 ppb thus allowing a greater than 10,000-fold safety factor.

See environmental fate data in section H3.

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9. USE OF RESOURCES AND ENERGY

Due to the rather limited applications for this product, the simple precursors used in manufacturing the product and relatively small quantities that will be used, only a minimal amount of renewable natural resources will be consumed in the production and distribution of this product. The starting raw materials for the production of KX-6145 will be commercially purchased commodity chemicals and will meet Food Chemical Codex requirements for food grade materials. The actual amount of resources used will depend on the market penetration and demand for the finished product. No resources should be used in treating/disposing of spent product. Disposal of unused product will represent a rare event. Infrequently, the product may be spilled and enter the treatment facility directly.

This product may replace the use of chlorine dioxide and acidified sodium chlorite solutions that are currently used in this application. Although the products have very similar use profiles, they are very different. Both products are produced by renewable resources and degrade into environmentally acceptable products. The net effect is that there is not a significant difference in the use of energy or resources of the two products.

Based on the use patterns of this product, no effects are anticipated on endangered species. Use of this product will not adversely impact any property listed in the National Register of Historic Places.

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10. MITIGATION MEASURES

None necessary.

11. ALTERNATIVES TO THE PROPOSED ACTION

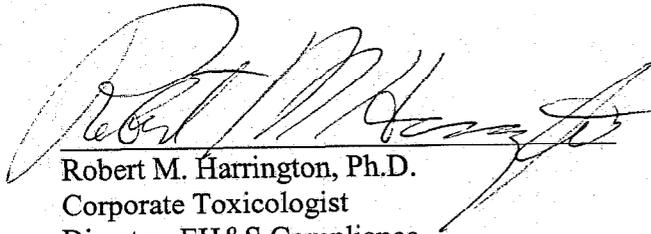
None.

12. PREPARER

Robert M. Harrington, Ph.D.
Corporate Toxicologist
Director, EH&S Compliance
Ecolab Inc.

13. CERTIFICATION

The undersigned official certifies that the information presented is true, accurate and complete to the best of the knowledge of Ecolab Inc.


Robert M. Harrington, Ph.D.
Corporate Toxicologist
Director, EH&S Compliance

12/14/00
Date

000507

Section H2
Component Material Safety Data Sheets (MSDSs)

The following MSDSs are included in this section:

Hydrogen Peroxide

Acetic Acid

Peroxyacetic Acid

Octanoic Acid

Peroxyoctanoic Acid

HEDP

000508

HYDROGEN PEROXIDE
MATERIAL SAFETY DATA SHEET

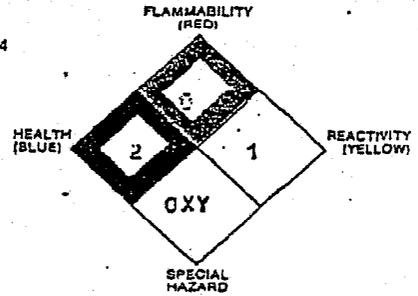
MATERIAL SAFETY DATA 7722

84 1 16

NFPA Designation 704

HYDROGEN PEROXIDE 35%
FOOD GRADE

DEGREE OF HAZARD
4 = EXTREME
3 = HIGH
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT



EMERGENCY TELEPHONE NOS:
CHEMTREC (800) 424-9300
MEDICAL (303) 595-9048 CALL COLLECT
OTHER (609) 924-6677 CALL COLLECT

REVISION: 08

EFFECTIVE: 04/03/90

PRINTED: 06/05/90

===== PRECAUTIONARY INFORMATION =====

PRECAUTIONARY STATEMENT...:
(PLEASE USE THIS STATEMENT
TO SATISFY THE IN-PLANT
LABELING REQUIREMENTS
OF THE OSHA HAZARD
COMMUNICATIONS STANDARD
29CFR 1910.1200)

HEALTH: LIQUID IS CORROSIVE TO THE EYE AND
SKIN AND DIRECT EYE CONTACT MAY CAUSE
IRREVERSIBLE TISSUE DAMAGE INCLUDING BLINDNESS.
INHALATION OF MIST OR VAPOR WILL CAUSE SEVERE
IRRITATION OF LUNGS, THROAT AND NOSE THAT
USUALLY SUBSIDES AFTER EXPOSURE CEASES.
SWALLOWING MAY PRODUCE CORROSION (BURNING) OF
THE GASTROINTESTINAL TRACT THAT MAY BE LIFE-
THREATENING.
PHYSICAL: INITIATES COMBUSTION IN OTHER
MATERIALS BY CAUSING FIRE THROUGH RELEASE OF
OXYGEN.

===== INGREDIENTS =====

CAS# AND COMPONENT.....:

CANADIAN PRODUCT
IDENTIFICATION NUMBER.....: 2014

MATERIAL/COMPONENT: HYDROGEN PEROXIDE
PERCENT.....: 35%
CAS #.....: 7722-84-1
HAZARD CLASS.....: OXIDIZER
MATERIAL/COMPONENT: WATER
PERCENT.....: 65%

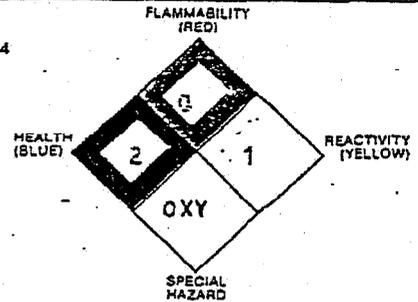


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REVISION: 08	EFFECTIVE: 04/03/90	PRINTED: 06/05/90
===== PHYSICAL DATA =====		
MELTING/FREEZING POINT....:	-33*C (-27*F)	
BOILING POINT.....:	108*C (226*F)	
VAPOR PRESSURE.....:	23.3 MM HG @ 30*C	
VAPOR DENSITY (AIR = 1)....:	UNKNOWN	
ROOM TEMPERATURE		
APPEARANCE AND STATE:	CLEAR, COLORLESS LIQUID	
ODOR.....:	ODORLESS	
SPECIFIC GRAVITY (H2O =1):	1.13 @ 20*C/4*C	
SOLUBILITY IN H2O % BY WT:	100%	
% VOLATILES BY VOLUME.....:	100%	
EVAPORATION RATE		
(BUTYL ACETATE = 1)....:	ABOVE 1	
PH (AS IS).....:	2.0-3.0	
PH (1% SOLUTION).....:	5.0-6.0	
ODOR THRESHOLD.....:	NOT AVAILABLE	
DENSITY (GMS/ML).....:	NOT AVAILABLE	
COEFF. WATER/OIL DIST.....:	NOT AVAILABLE	
===== FIRE, EXPLOSION AND REACTIVITY DATA =====		
FLASH POINT.....:	NON-FLAMMABLE	
AUTOIGNITION TEMPERATURE..:	NON-COMBUSTIBLE	
FLAMMABLE LIMITS UPPER...:	NON-COMBUSTIBLE	
(AIR) LOWER...:	NON-COMBUSTIBLE	
EXTINGUISHING MEDIA.....:	WATER, WATER FOG, CO2, DRY CHEMICAL	
SPECIAL FIREFIGHTING.....:	ANY TANK OR CONTAINER SURROUNDED BY FIRE SHOULD BE FLOODED WITH WATER FOR COOLING. IF HYDROGEN PEROXIDE IS LEAKING, WEAR FULL PROTECTIVE CLOTHING AND NIOSH CERTIFIED BREATHING APPARATUS (SCBA).	
DEGREE OF FIRE AND	HYDROGEN PEROXIDE ITSELF IS NONCOMBUSTIBLE. ON DECOMPOSITION RELEASES OXYGEN WHICH MAY INTENSIFY FIRE. HYDROGEN PEROXIDE VAPORS AND MISTS ARE EXTREMELY IRRITATING TO EYES AND SKIN.	
EXPLOSION HAZARD		
STABILITY.....:	UNSTABLE	
HAZARDOUS POLYMERIZATION..:	WILL NOT OCCUR	
CONDITIONS TO AVOID.....:	EXCESSIVE HEAT, CONTAMINATION OF ANY KIND.	

MATERIAL SAFETY DATA 7722

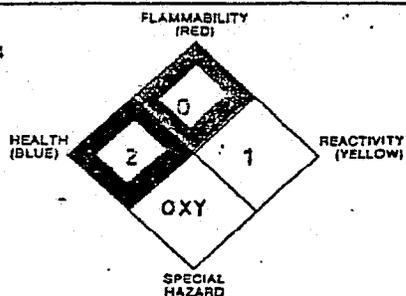
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===== FIRE, EXPLOSION AND REACTIVITY DATA =====		
MAJOR CONTAMINANTS THAT... CONTRIBUTE TO INSTABILITY INCOMPATIBILITY.....	REDUCING AGENTS, RUSTS, DIRT, ORGANIC MATERIALS, PH ABOVE 4. IRON AND OTHER HEAVY METALS, GALVANIZED IRON, COPPERS, COPPER ALLOYS, RUST, DIRT, ORGANICS, WOOD, PAPER OR OTHER COMBUSTIBLES. OXYGEN WHICH SUPPORTS COMBUSTION.	
HAZARDOUS DECOMPOSITION... PRODUCTS	NOT AVAILABLE	
SENSITIVITY TO MECH..... IMPACT	NOT AVAILABLE	
SENSITIVITY TO STATIC..... DISCHARGE	NOT AVAILABLE	
===== ROUTES OF EXPOSURE =====		
EYE CONTACT.....	EXTREMELY IRRITATING- CORROSIVE (RABBIT) REF. I83-748	SOURCE DATE FMC 1983
SKIN CONTACT.....	MILDLY IRRITATING AFTER 4 HRS. EXPOSURE; SKIN DESTRUCTION AFTER 24 HRS. EXPOSURE (RABBIT) REF. I83-747	FMC 1983
SKIN ABSORPTION.....	LD50 ABOVE 2000 MG/KG (RABBIT) REF. I83-746	FMC 1983
INHALATION.....	TLV = 1 PPM (1.5 MG/M3) TWA PEL = 1 PPM TWA LC50 = 2MG/L (90% H2O2, RAT 4 HR.)	ACGIH 1987 OSHA 1985 RTECS
INGESTION.....	LD50 = 1193 MG/KG (MALE RAT) AND 1270 MG/KG (FEMALE RAT) REF. I83-745 LC50 - NOT AVAILABLE	FMC 1983
===== EXPOSURE LIMITS =====		
	TLV = 1 PPM (1.5MG/M3) TWA PEL = 1 PPM TWA	SOURCE DATE ACGIH 1987 OSHA 1985 1910.1000
PAGE 04		



MATERIAL SAFETY DATA

7722

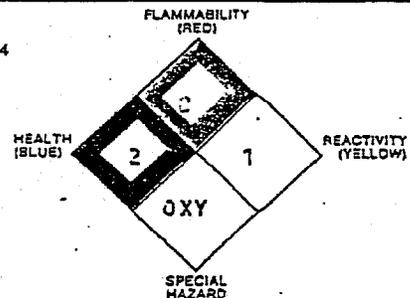
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===== EFFECTS OF OVEREXPOSURE =====		
ACUTE EXPOSURE.....:	SEVERE IRRITANT TO EYES, NOSE, THROAT, LUNGS AND GASTROINTESTINAL TRACT. MAY CAUSE IRREVERSIBLE TISSUE DAMAGE TO THE EYES, INCLUDING BLINDNESS.	
CHRONIC EXPOSURE.....:	THERE ARE REPORTS OF LIMITED EVIDENCE OF CARCINOGENICITY OF HYDROGEN PEROXIDE TO MICE ADMINISTERED HIGH CONCENTRATIONS IN THEIR DRINKING WATER (IARC MONOGRAPH 36, 1985). HOWEVER THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER CONCLUDED THAT HYDROGEN PEROXIDE COULD NOT BE CLASSIFIED AS TO ITS CARCINOGENICITY TO HUMANS (GROUP III CARCINOGEN). ACCORDINGLY THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) DOES NOT REQUIRE THAT HYDROGEN PEROXIDE BE IDENTIFIED AS A CARCINOGEN.	
(EFFECTS CONSIDERED INCLUDE: SENSITIVITIES, CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY, SYNERGISTIC PRODUCTS, AND ANY MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE.)	SENSITIVITIES, TERATOGENICITY, MUTAGENICITY, SYNERGISTIC PRODUCTS, REPRODUCTIVE TOXICITY, AND ANY MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY EXPOSURE WERE EXAMINED AND NO INFORMATION WAS FOUND OR IS AVAILABLE.	
===== EMERGENCY AND FIRST AID PROCEDURES =====		
EYES.....:	IMMEDIATELY FLUSH WITH A LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES, LIFTING UPPER AND LOWER LIDS INTERMITTENTLY. SEE AN OPHTHALMOLOGIST.	
SKIN.....:	WASH WITH LARGE AMOUNTS OF WATER. IF IRRITATION PERSISTS, OBTAIN MEDICAL ATTENTION.	
INHALATION.....:	REMOVE TO FRESH AIR. CALL A PHYSICIAN.	
INGESTION.....:	IF SWALLOWED, DRINK PLENTY OF WATER IMMEDIATELY TO DILUTE. DO NOT INDUCE VOMITING. SEE A PHYSICIAN.	
DECONTAMINATION PROCEDURE:	WASH AREA WITH LARGE AMOUNTS OF WATER.	



MATERIAL SAFETY DATA

7722

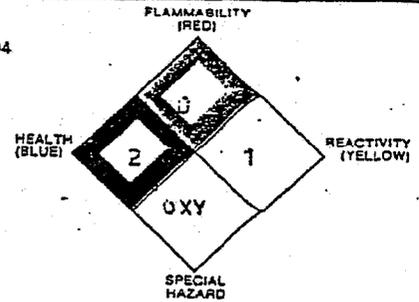
84 1 16

NFPA Designation 704

HYDROGEN PEROXIDE 35%
FOOD GRADE

DEGREE OF HAZARD

- 4 = EXTREME
- 3 = HIGH
- 2 = MODERATE
- 1 = SLIGHT
- 0 = INSIGNIFICANT



EMERGENCY TELEPHONE NOS:

CHEMTREC (800) 424-9300
 MEDICAL (503) 595-9048 CALL COLLECT
 OTHER (609) 924-6677 CALL COLLECT

REVISION: 08

EFFECTIVE: 04/03/90

PRINTED: 06/05/90

===== STORAGE AND HANDLING =====

(PLEASE USE THIS STATEMENT TO SATISFY THE IN-PLANT LABELING REQUIREMENTS OF THE OSHA HAZARD COMMUNICATIONS STANDARD 29CFR 1910.1200)

WEAR CUP TYPE CHEMICAL SAFETY GOGGLES, POLYESTER OR ACRYLIC FULL COVER CLOTHING AND RUBBER OR NEOPRENE GLOVES AND SHOES. AVOID EXCESSIVE HEAT. AVOID CONTAMINATION OF ANY KIND. CONTAMINATION MAY CAUSE DECOMPOSITION AND GENERATION OF OXYGEN GAS WHICH COULD RESULT IN HIGH PRESSURES AND POSSIBLE CONTAINER RUPTURE. HYDROGEN PEROXIDE SHOULD NOT BE STORED IN AN UNVENTED CONTAINER AND SHOULD BE TRANSFERRED ONLY IN A PRESCRIBED MANNER (SEE FMC TECHNICAL BULLETINS). NEVER RETURN UNUSED HYDROGEN PEROXIDE TO ORIGINAL CONTAINER. EMPTY DRUMS SHOULD BE RINSED WITH WATER BEFORE DISCARDING. UTENSILS USED FOR HANDLING HYDROGEN PEROXIDE SHOULD BE MADE ONLY OF THE FOLLOWING COMPATIBLE MATERIALS: GLASS, STAINLESS STEEL, ALUMINUM OR PLASTIC. STORAGE SHOULD CONFORM TO CONDITIONS DESCRIBED IN NFPA BULLETIN 43A (CODE FOR THE STORAGE OF LIQUID AND SOLID OXIDIZING MATERIALS). NFPA HAZARD CLASS II OXIDIZER.

===== DISPOSAL, SPILL OR LEAK PROCEDURES =====

PROCEDURE FOR RELEASE.....:
OR SPILL

DILUTE WITH A LARGE VOLUME OF WATER AND HOLD IN A POND OR DIKED AREA UNTIL THE H2O2 DECOMPOSES. DISPOSE OF ACCORDING TO THE METHODS OUTLINED BELOW FOR WASTE DISPOSAL.

WASTE DISPOSAL METHOD.....:

AN ACCEPTABLE METHOD OF DISPOSAL IS TO DILUTE WITH A LARGE AMOUNT OF WATER AND ALLOW THE HYDROGEN PEROXIDE TO DECOMPOSE FOLLOWED BY DISCHARGE INTO A SUITABLE TREATMENT SYSTEM IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL ENVIRONMENTAL LAWS, RULES, REGULATIONS, STANDARDS AND OTHER REQUIREMENTS. BECAUSE ACCEPTABLE METHODS OF DISPOSAL MAY VARY BY LOCATION AND BECAUSE REGULATORY REQUIREMENTS MAY CHANGE, THE APPROPRIATE REGULATORY AGENCIES SHOULD BE CONTACTED PRIOR TO DISPOSAL.



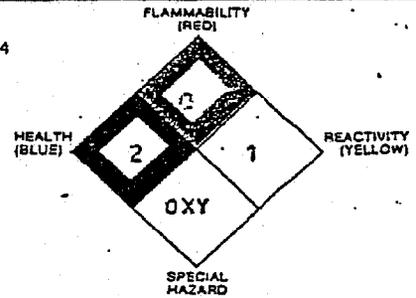
MATERIAL SAFETY DATA 7722

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MEDICAL (303) 595-9048
OTHER (609) 924-6677

CALL COLLECT
CALL COLLECT

REVISION: 08

EFFECTIVE: 04/03/90

PRINTED: 06/05/90

===== TRANSPORTATION DATA =====

DOT PROPER SHIPPING NAME.: HYDROGEN PEROXIDE SOLUTION 35%
DOT CLASSIFICATION.....: OXIDIZER
DOT LABELS.....: OXIDIZER
DOT MARKING.....: HYDROGEN PEROXIDE SOLUTION 35%, UN NO 2014
DOT PLACARD.....: OXIDIZER (NOT REQUIRED FOR SHIPMENTS IN BULK
QUANTITIES. REF. CFR 49 173.266, E)
UN NUMBER.....: 2014
HAZARDOUS SUBSTANCE/RQ....: NOT LISTED
49 STCC NUMBER.....: 4918775

EMERGENCY ACCIDENT
PRECAUTIONS AND PROCEDURE: KEEP PEOPLE AWAY. WEAR FULL PROTECTIVE CLOTHING.
USE WATER ONLY FOR FIRE.
PRECAUTIONS TO BE TAKEN...: PROTECT FROM PHYSICAL DAMAGE. DRUMS SHOULD NOT
IN TRANSPORTATION BE STACKED DURING TRANSIT. KEEP DRUMS IN UP-
RIGHT POSITION.
TYPE PACKAGES.....: POLYETHYLENE CONTAINERS/DOT 34
OTHER SHIPPING IDS.....:

===== ADDITIONAL REGULATORY INFORMATION =====

MATERIAL IS REPORTED IN EPA TSCA INVENTORY LIST? YES
MATERIAL IS LISTED AS A CARCINOGEN/POTENTIAL
CARCINOGEN IN FOLLOWING
NTP ANNUAL REPORT... ? NO
IARC GROUP I OR II...? NO
OSHA 29CFR PART 1910
SUBPART Z ? NO
ACGIH APPENDIX A.....? NO
DOES PRODUCT CONTAIN A TOXIC CHEMICAL(S) SUBJECT
TO SARA TITLE III SECTION 313 REPORTING..... NO
CHEMICAL(S)..... THIS PRODUCT DOES NOT CONTAIN ANY TOXIC CHEM-
ICALS IN QUANTITIES SUBJECT TO THE REPORTING
REQUIREMENTS OF SECTION 313 OF TITLE III OF THE
SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT
OF 1986 (SARA) AND 40 CFR PART 372.



MATERIAL SAFETY DATA

7722

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NFPA Designation 704

HYDROGEN PEROXIDE 35%
FOOD GRADE

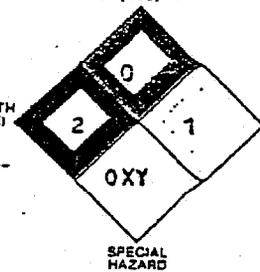
DEGREE OF HAZARD

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- 1 = SLIGHT
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HEALTH (BLUE)

FLAMMABILITY (RED)

REACTIVITY (YELLOW)



EMERGENCY TELEPHONE NOS:

CHEMTREC (800) 424-9300

MEDICAL (303) 595-9048 CALL COLLECT

OTHER (609) 924-6677 CALL COLLECT

REVISION: 08

EFFECTIVE: 04/03/90

PRINTED: 06/05/90

===== ADDITIONAL REGULATORY INFORMATION =====

SARA TITLE III SECTION
311/312 CLASSIFICATION...

IMMEDIATE (ACUTE) HEALTH HAZARD.
FIRE HAZARD.

=====

PROPOSITION 65 - CALIFORNIA
SAFE DRINKING WATER AND TOXICS ENFORCEMENT ACT
OF 1986 (PROPOSITION 65) - CALIFORNIA. THIS ACT
REQUIRES THAT THE GOVERNMENT OF CALIFORNIA
DEVELOP A LIST OF CARCINOGENS AND REPRODUCTIVE
TOXINS AND THAT NO PERSONS DOING BUSINESS SHALL
KNOWINGLY EXPOSE ANY INDIVIDUAL TO A CHEMICAL
KNOWN TO THE STATE TO CAUSE CANCER OR REPRO-
DUCTIVE TOXICITY WITHOUT FIRST GIVING CLEAR AND
REASONABLE WARNING TO SUCH AN INDIVIDUAL.
FMC WOULD LIKE YOU TO KNOW THAT OUR 70% HYDROGEN
PEROXIDE CONTAINS THE INDICATED CONCENTRATION(S)
OF CHEMICALS WHICH ARE LISTED BY CALIFORNIA AS
CHEMICALS KNOWN TO CAUSE CANCER(A), REPRODUCTIVE
TOXICITY(B) OR BOTH OF THESE EFFECTS(C).

CHEMICAL	CONCENTRATION (PPM, PPB, % ETC)	LISTED AS: (A), (B), (C)
=====	=====	=====
ARSENIC	EQUAL TO/LESS THAN 0.1 PPM	(A)
CADMIUM	EQUAL TO/LESS THAN 0.1 PPM	(A)
CHROMIUM	EQUAL TO/LESS THAN 0.2 PPM	(A)
LEAD	EQUAL TO/LESS THAN 0.5 PPM	(B)

NOTE:
PERCENTAGES LESS THAN 70% HYDROGEN PEROXIDE
WOULD CONTAIN PROPORTIONATELY LESS CONCENTRATION
OF THE CHEMICALS IDENTIFIED.



MATERIAL SAFETY DATA

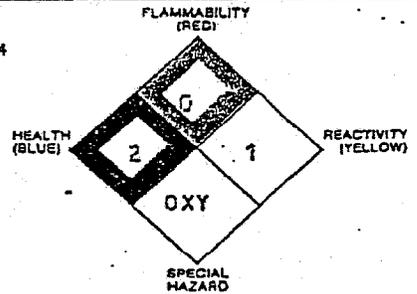
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CALL COLLECT

CALL COLLECT

REVISION: 08

EFFECTIVE: 04/03/90

PRINTED: 06/05/90

===== ADDITIONAL INFORMATION =====

AQUATIC TOXICITY CLASSIFICATION	SOURCE	DATE
- NIOSH RTECS NO. 79-100		
SLIGHTLY TOXIC TO FATHEAD MINNOW	FMC SC	1979
(96 HR LC50: 22-35 MG/L)		

===== ADDITIONAL TECHNICAL DATA =====

SUGGESTED USES.....

FOOD GRADE HYDROGEN PEROXIDE IS SPECIAL HIGH PURITY MATERIAL. IT IS DESIGNED FOR USE IN PROCESSING APPLICATIONS THAT REQUIRE MATERIAL OF EXCEEDINGLY LOW RESIDUE AND FREE OF ORGANIC CONTAMINANTS. THE PRODUCT MEETS THE REQUIREMENTS OF THE FOOD CHEMICALS CODEX EDITION III, PAGES 146-147.

TYPICAL ANALYSIS.....

ACTIVE OXYGEN CONTENT, %	16.5
SPECIFIC GRAVITY (20°C/4°C)	1.13
LBS/GAL (KG/M3 OR G/L) @ 20°C	9.42 (1130)
H2O2 GRAM PER LITER @ 20°C	396

SPECIFICATIONS.....

RESIDUE (100°C), %	0.006 MAX, 60 PPM (UG/G)
ORGANIC MATERIAL	NIL
HEAVY METALS AS LEAD, %	0.001 MAX, 10 PPM (UG/G)
ACIDITY AS H2SO4, %	0.03 MAX, 300 PPM (UG/G)
STABILITY, 24 HOURS @ 100°C	96% MIN

ADDITIONAL INFORMATION....

THE FOLLOWING FMC BULLETINS, AVAILABLE ON REQUEST, PROVIDE ADDITIONAL DETAILED INFORMATION ON PROPERTIES, HANDLING PROCEDURES AND SAFETY PRECAUTIONS OF HYDROGEN PEROXIDE:

- "HYDROGEN PEROXIDE", TECHNICAL BULLETIN #141
- "STORAGE EQUIPMENT FOR BULK SHIPMENTS OF HYDROGEN PEROXIDE", TECHNICAL BULLETIN #125
- "THE ANALYSIS OF HYDROGEN PEROXIDE SOLUTIONS", TECHNICAL BULLETIN #59

RETURN TO MENU

ACETIC ACID
MATERIAL SAFETY DATA SHEET

AAC100 - ACETIC ACID GLACIAL

Celanese

DISTRIBUTED BY:
INDUSTRIAL CHEMICALS INC.
2042 MONTREAT DRIVE
BIRMINGHAM, AL 35216-4046
205-823-7330

Product Name: ACETIC ACID, GLACIAL
Product Code: 111113
MSDS Number : 2
Version Date: November 5 1998
rec'd 12/19/98

Page 1 of 9

Material Safety Data Sheet

Print date - November 04, 1998 4:33 a.m. 3520 PG1A.XDP21001 - 254.1 (1504/2105)

1. CHEMICAL PRODUCT and COMPANY IDENTIFICATION

Product Name: ACETIC ACID, GLACIAL
Product Code: 111113
MSDS Number : 2

SYNONYMS: ETHANOIC ACID
METHANECARBOXYLIC ACID

TRANSPORTATION EMERGENCY PHONE
NUMBER (24 HOURS/DAY):
In USA, call.....800 424 9300.
Outside USA, call*....202 483 7617.
*collect calls accepted
In Canada, call.....403 477 8339.

2. COMPOSITION | INFORMATION on INGREDIENTS

COMPONENT	CAS NUMBER	
ACETIC ACID *	64-19-7	99.85%

*OSHA hazardous according to 29 CFR 1910.1200

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Acetic acid is a clear, colorless mobile liquid with a strong, acrid, vinegar-like odor.

WARNING!

Flammable liquid and vapor.

POTENTIAL HEALTH EFFECTS

ROUTES OF EXPOSURE:

Skin, Eyes, Inhalation, Ingestion

IMMEDIATE EFFECTS

TRANSPORTATION EMERGENCY	800 424 9300	IN U.S., CHEMTREC - 24 HRS/DAY
PRODUCT EMERGENCY:	800 835 5235	CELANESE - 24 HRS/DAY
PRODUCT INFORMATION:	972 443 4000	(7:30 AM TO 4:15 PM, CST)

000519

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
Product Code: 111113
MSDS Number : 2
Version Date: November 5 1998

Page 2 of 9

Print date - November 23, 1998 4:33 a.m. 2620 PG1A.X0121001 - 259.2 (1545/2185)

3. HAZARDS IDENTIFICATION (Continued)

SKIN:

Can cause chemical burn.

EYES:

Can cause chemical burn--damage irreversible. Vapors are severely irritating.

INHALATION:

Causes severe irritation of nasal passages, throat and lungs. Can cause pulmonary edema (accumulation of fluid in the lungs); signs and symptoms can be delayed for several hours.

INGESTION:

Causes severe irritation of and damage to mouth, throat and stomach.

DELAYED/LONG TERM EFFECTS

REPRODUCTION: No evidence of reproductive effects (human experience).

CARCINOGENIC:

No evidence of carcinogenicity (human experience).

MUTAGENIC:

No evidence of mutagenicity (human experience).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Significant exposure to this chemical may adversely affect people with chronic disease of the respiratory system, skin, eyes and/or teeth.

FOR FURTHER INFORMATION, SEE:

- Section 4 - First Aid Measures
- Section 5 - Fire Fighting Measures
- Section 6 - Accidental Release Measures
- Section 8 - Exposure Controls/Personal Protection
- Section 9 - Physical and Chemical Properties
- Section 10 - Stability and Reactivity

TRANSPORTATION EMERGENCY
PRODUCT EMERGENCY:
PRODUCT INFORMATION:

800 474 9300
800 833 5235
972 443 4000

IN U.S., CHEMTREC - 24 HRS/DAY
CELANESE - 24 HRS/DAY
(7:30 AM TO 4:15 PM, CST)

000520

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
Product Code: 111113
MSDS Number: 2
Version Date: November 5 1998

Page 3 of 9

Print date - November 5th, 1998 4:33 a.m. 3529 PG1A X0P21001 - 2563 (1586/2185)

4. FIRST AID MEASURES

- SKIN:** Remove contaminated clothing and wash contaminated skin with large amounts of soap and water. If irritation persists, contact a physician.
- EYES:** Flush eyes with water for at least 15 minutes. Contact a physician immediately.
- INHALATION:** Remove patient from contaminated area. If breathing has stopped, give artificial respiration, then oxygen if needed. Contact a physician immediately.
- INGESTION:** Patient should be made to drink large quantities of water. Do not induce vomiting. Contact a physician immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASHPOINT CLOSED CUP: 42.8 C (109. F)
FLASHPOINT OPEN CUP: 44.5 C (112. F)
UPPER EXPLOSIVE LMT: 16.6
% In air by volume.
LOWER EXPLOSIVE LMT: 5.3
% In air by volume.

PRODUCTS OF COMBUSTION:

Carbon monoxide.

EXTINGUISHING MEDIA:

Use carbon dioxide or dry chemical for small fires; alcohol-type aqueous film-forming foam or water spray for large fires.

FIRE FIGHTING INSTRUCTIONS:

If potential for exposure to vapors or products of combustion exists, wear complete personal protective equipment, including self-contained breathing apparatus with full face-piece operated in pressure demand or other positive pressure mode. Water spray can be used to reduce intensity of flames and to dilute spills to nonflammable mixture. Use water spray to cool fire-exposed structures and vessels.

TRANSPORTATION EMERGENCY 800 424 9308
PRODUCT EMERGENCY: 800 435 5235
PRODUCT INFORMATION: 972 443 4000

IN U.S., CHEMTREC - 24 HRS/DAY
CELANESE - 24 HRS/DAY
(7:30 AM TO 4:15 PM, CST)

000521

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
 Product Code: 111113
 MSDS Number : 2
 Version Date: November 5 1998

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Print Date - November 21, 1998 4:22 P.M. 3620 PG 1A.X07-21001 - 251.4 (15872125)

6. ACCIDENTAL RELEASE MEASURES

Eliminate ignition sources. Avoid eye or skin contact; see "Section 8 - Exposure Controls/Personal Protection" for respirator information. Place leaking containers in well-ventilated area with spill containment. If fire potential exists, blanket spill with alcohol-type aqueous film-forming foam or use water spray to disperse vapors. Contain spill to facilitate clean-up. Clean-up methods may include absorbent materials, vacuum truck, etc. Avoid run-off into storm sewers and ditches leading to water ways.

Call the National Response Center (800 424 8802) if the quantity spilled is equal to or greater than the reportable quantity (RQ) under CERCLA "Superfund": 5000 lb/day.

If an odor or acidity problem exists, neutralize with lime or sodium bicarbonate.

For more information, see "Section 15 - Regulatory Information".

7. HANDLING and STORAGE

HANDLING:

Use with adequate ventilation. Keep containers closed when not in use. Always open containers slowly to allow any excess pressure to vent. Avoid breathing vapor. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Decontaminate soiled clothing thoroughly before re-use. Destroy contaminated leather clothing.

When transferring, follow proper grounding procedures. Keep away from heat, sparks and flames.

STORAGE:

Store in a well-ventilated area. Use only DOT-approved containers.

Do not store with incompatible materials; see "Section 10 - Stability and Reactivity".

TRANSPORTATION EMERGENCY	800 424 9300	IN U.S., CHEMTREC - 24 HRS/DAY
PRODUCT EMERGENCY:	800 435 5235	CELANESE - 24 HRS/DAY
PRODUCT INFORMATION:	972 443 4000	(7:30 AM TO 4:15 PM, CST)

000522

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
Product Code: 111113
MSDS Number : 2
Version Date: November 5 1998

Page 3 of 9

Print date - November 04, 1998 4:33 a.m. 3020 PG1A X0421001 - 2893 (1552/2105)

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS:

General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred.

PROTECTIVE EQUIPMENT

A safety shower and eye bath should be readily available.

SKIN:

Wear impervious clothing and gloves to prevent repeated or prolonged contact. The recommended material of construction is:
Nitrile rubber.

EYES:

Wear chemical goggles when there is a reasonable chance of eye contact.

INHALATION:

Based on workplace contaminate level and working limits of the respirator, use a respirator approved by NIOSH/MSHA. The following is the minimum recommended equipment for an acceptable level of exposure. To estimate an acceptable level of exposure, see "Section 3 - Hazards Identification", "Section 8 - Exposure Controls/Personal Protection" and "Section 11 - Toxicological Information".

For concentrations ≥ 1 and ≤ 10 times the acceptable level: Use air-purifying respirator with full facepiece and organic vapor cartridge(s) or air-purifying full facepiece respirator with an organic vapor canister or a full facepiece powered air-purifying respirator filled with organic vapor cartridge(s).

For concentrations > 10 and the lower of either < 100 times the acceptable level or $< \text{the IDLH}$: Use Type C full facepiece supplied-air respirator operated in pressure-demand or continuous-flow mode.

For concentrations ≥ 100 times the acceptable level or IDLH level or unknown concentration (such as in emergencies): Use self-contained breathing apparatus with full facepiece in pressure-demand mode. Type C positive-pressure full facepiece supplied-air respirator with an auxiliary positive-pressure self-contained breathing apparatus escape system.

TRANSPORTATION EMERGENCY 800 424 5300
PRODUCT EMERGENCY: 800 835 5235
PRODUCT INFORMATION: 972 443 4004

IN U.S., CHEMTREC - 24 HRS/DAY
CELANESE - 24 HRS/DAY
(7:30 AM TO 4:15 PM, CST)

000523

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
 Product Code: 111113
 MSDS Number : 2
 Version Date: November 5 1998

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Print Date - November 6th, 1998 4:33 a.m. 2020 PQ1A X0121001 - 259.8 (1589/2105)

INHALATION: (Continued)

For escape: Use self-contained breathing apparatus with full facepiece or any respirator specifically approved for escape.

EXPOSURE GUIDELINES:**ACETIC ACID (64-19-7)**

OSHA PEL	ACGIH TLV	CEL WEL
25 MG/M3 (PEL)	37 MG/M3 (STEL)	None
10 PPM (PEL)	15 PPM (STEL)	None
None	25 MG/M3 (TWA)	None
None	10 PPM (TWA)	None

Celanese has adopted the ACGIH TLV.

1990 NIOSH IDLH*: 1000 ppm
 1994 NIOSH IDLH: 50 ppm

*Recognized by OSHA.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE :
 Clear, colorless mobile liquid.
 ODOR :
 Strong, acrid, vinegar-like odor.
 PHYSICAL STATE :
 Liquid
 VAPOR PRESSURE : 11.4
 mm Hg @ 20 C
 VAPOR DENSITY : 2.07
 Air = 1 @ 20 C
 BOILING POINT : 118.1 C (244.6 F)
 (760 mm Hg)
 FREEZING POINT : 16.6 C (61.9 F)
 SOLUBILITY :
 Complete @ 20 C
 SPECIFIC GRAVITY : 1.051
 H2O = 1 @ 20/20 C

TRANSPORTATION EMERGENCY	800 424 5360	IN U.S., CHEMTREC - 24 HRS/DAY
PRODUCT EMERGENCY:	800 835 5235	CELANESE - 24 HRS/DAY
PRODUCT INFORMATION:	972 443 4000	(7:30 AM TO 4:15 PM, CST)

000524

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
Product Code: 111113
MSDS Number: 2
Version Date: November 5 1998

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Print date - November 6th, 1998 4:33 a.m. 0620 PQ1A X0H21001 - 236.7 (15902100)

9. PHYSICAL and CHEMICAL PROPERTIES (Continued)

EVAPORATION RATE : 1.0
BuAc = 1
% VOLATILES : 100.0
MOLECULAR WEIGHT : 60.0

10. STABILITY and REACTIVITY

CHEMICAL STABILITY:
Stable.

CONDITIONS TO AVOID:
Flame.

INCOMPATIBILITY:
Oxidizing agents, for example, hydrogen peroxide, nitric acid, perchloric acid or chromium trioxide; strong alkalis such as sodium hydroxide.

HAZARDOUS DECOMPOSITION PRODUCTS:
Carbon monoxide.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

Oral LD50 : 3.3 g/kg (rats); slightly toxic to animals.

Dermal LD50 : 1.1 g/kg (rabbits); moderately toxic to animals by absorption.

Inhalation LCLo : 16,000 ppm (rats, 4 hrs.); practically non-toxic to animals.

TRANSPORTATION EMERGENCY	800 424 9300	IN U.S., CHEMTREC - 24 HRS/DAY
PRODUCT EMERGENCY:	800 935 5235	CELANESE - 24 HRS/DAY
PRODUCT INFORMATION:	972 443 4000	(7:30 AM TO 4:15 PM, CST)

000525

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
Product Code: 11113
MSDS Number : 2
Version Date: November 5 1998

Page 8 of 9

Print Date - November 05, 1998 4:33 a.m. 3E20 PQ1A XDH21001 - 259.8 (15912148)

12. ECOLOGICAL INFORMATION

This information is being researched.

13. DISPOSAL CONSIDERATIONS

Note: This information applies to the manufactured product.

All notification, clean-up and disposal should be carried out in accordance with federal, state and local regulations. Preferred methods of waste disposal are incineration or biological treatment in federal/state approved facility.

Hazardous waste (40 CFR 261): Yes; D001, D002.

14. TRANSPORT INFORMATION

US Department of Transportation
Shipping name : ACETIC ACID, GLACIAL
Hazard class : 8, Corrosive Material
Subsidiary hazard : 3, Flammable Liquid
United Nations no. : UN2789
Packing group : II
North American ER Guide : 132
DOT Reportable Quantity (RQ): 5000 lb/2270 kg

Canadian Transportation of Dangerous Goods:
Classification : Corrosive 8 (9.2)
Subsidiary hazard : Flammable Liquid 3

15. REGULATORY INFORMATION

RECIPIENT MUST COMMUNICATE ALL PERTINENT INFORMATION HEREIN TO EMPLOYEES AND CUSTOMERS.

STATE REGULATIONS

The following chemicals associated with the product are subject to the right-to-know regulations in these states:
ACETIC ACID (64-19-7): CT, FL, IL, MA, NJ, NY, PA, RI

TRANSPORTATION EMERGENCY	800 424 9300	IN U.S., CHEMTREC - 24 HRS/DAY
PRODUCT EMERGENCY:	800 835 5235	CELANESE - 24 HRS/DAY
PRODUCT INFORMATION:	972 443 4000	(7:30 AM TO 4:15 PM, CST)

000526

AAC100 - ACETIC ACID GLACIAL

Celanese

Product Name: ACETIC ACID, GLACIAL
 Product Code: 111113
 MSDS Number : 2
 Version Date: November 5 1998

Page 9 of 9

Print date - November 6th, 1998 4:33 a.m. 3820 PGLA.X01-G1001 - 254.9 (15922185)

15. REGULATORY INFORMATION (Continued)**U.S. FEDERAL REGULATIONS**

We certify that all components are either on the TSCA inventory or qualify for an exemption.

ENVIRONMENTAL:

CERCLA :
 ACETIC ACID 99.85% (64-19-7)
 SARA 304 :
 ACETIC ACID 99.85% (64-19-7)

INTERNATIONAL REGULATIONS**WHMIS INGREDIENT DISCLOSURE LISTED COMPONENTS:**

WHMIS CLASSIFICATION: Class B, Division 3; Class E;
 Class D, Division 2, Subdivision B.

This product has been classified in accordance with the hazard criteria of the CFR and the MSDS contains all the information required by the CFR.

16. OTHER INFORMATION

MSDS prepared by: Celanese Product Stewardship Department

DISCLAIMER:

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RETURN TO MENU

TRANSPORTATION EMERGENCY	800 424 9300	IN U.S., CHEMTREC - 24 HRS/DAY
PRODUCT EMERGENCY:	800 835 5235	CELANESE - 24 HRS/DAY
PRODUCT INFORMATION:	972 443 4000	(7:30 AM TO 4:15 PM, CST)

000527

PEROXYACETIC ACID
MATERIAL SAFETY DATA SHEET

124289

MATERIAL SAFETY DATA SHEET

Peracetic Acid 35%

FMCMSDS Ref. No: 79-21-0
Version: US/Canada
Date Approved: 10/20/1998
Revision No: 5**1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

PRODUCT NAME: Peracetic Acid 35%
SYNONYM(s): Peroxyacetic Acid, Acetyl Hydroperoxide
GENERAL USE: Used as an oxidizing agent for a variety of organic reactions.

MANUFACTURER

FMC Corporation
 Active Oxidant Division
 1735 Market Street
 Philadelphia, PA 19103
General Information: (215) 299-6000

Emergency Telephone Numbers:

CHEMTREC (800) 424-9300
Emergency Phone (303) 595-9048
 (Medical) Call Collect
Emergency Phone (716) 879-0400
 (Plant/Other) Call Collect

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>Chemical Name</u>	<u>CAS #</u>	<u>Wt. %</u>
Peroxyacetic Acid	79-21-0	35.5
Hydrogen Peroxide	7722-84-1	6.5
Acetic Acid	64-19-7	40
Sulfuric Acid	7664-93-9	1
Water	7732-18-5	17

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

IMMEDIATE CONCERNS: Flammable oxidizer: Stabilized peracetic acid decomposes under fire conditions to release oxygen that intensifies the fire. Use water to keep fire-exposed containers cool.

POTENTIAL HEALTH EFFECTS: Liquid and mist are corrosive (causing burns); direct contact could cause irreversible damage to eyes including blindness and/or irreversible destruction of skin tissue. Vapor/mist will irritate nose, throat and lungs but will usually subside when exposure ceases.

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Immediately flush with plenty of water while removing contaminated clothing and/or shoes, and thoroughly wash with soap and water. Obtain immediate medical attention. Contact a medical doctor if necessary.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing discomfort occurs and persists, see a medical doctor. If breathing has stopped, give artificial respiration and see a medical doctor immediately.

NOTES TO MEDICAL DOCTOR: This product can be corrosive to skin, eyes and mucous membranes. Consideration should be given to careful endoscopy as stomach or esophageal burns, perforations or strictures may occur. Careful gastric lavage with an endotracheal tube in place should be considered. Observation may be warranted. Treatment is controlled removal of exposure followed by symptomatic and supportive care.

5. FIRE FIGHTING MEASURES

FLASH POINT AND METHOD: Approximately 115°F (46°C) - closed cup

FLAMMABLE LIMITS: Not available

AUTOIGNITION TEMPERATURE: 218°C (424°F)

EXTINGUISHING MEDIA: Use water to keep fire exposed containers cool.

EXPLOSION HAZARDS: Flammable - oxidizer - decomposition releases oxygen that can initiate or promote combustion.

FIRE FIGHTING PROCEDURES: Use flooding quantities of water only. Use water spray to keep fire exposed containers cool. Fight fire from protected location or maximum distance. Chemical type extinguishers are not effective with peracetic acid or hydrogen peroxide. Use proper personal protective equipment and positive pressure self contained breathing apparatus.

SENSITIVITY TO STATIC DISCHARGE: Not available

SENSITIVITY TO IMPACT: Not available

HAZARDOUS DECOMPOSITION PRODUCTS: Oxygen that supports combustion and acetic acid.

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Approach release from upwind. Stop or control leak using special protective clothing and positive pressure self-contained breathing apparatus. Control run off and isolate discharged material for proper disposal. Do not allow undiluted material to enter storm or sanitary sewer systems.

7. HANDLING AND STORAGE

HANDLING: Transfer product from drums to process in closed system (hermetically) and if not possible use effective local exhaust ventilation. Empty drum as thoroughly as possible. Triple rinse before disposal. Avoid contamination; impurities accelerate decomposition. Never return product to original container.

STORAGE: Do not store near reducing agents, fuels or other non-compatible materials. Store in a cool (less than 86°F), dry, well ventilated area. Do not store in direct sunlight, or near sources of ignition or heat. Do not double stack. Use first in, first out storage system. Containers must be vented.

COMMENTS: VENTILATION: Provide mechanical local exhaust ventilation to prevent release of mist into the work area. If ventilation is inadequate or not available use acid gas cartridge or canister with full facepiece.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

<u>Chemical Name</u>	<u>TWA (ACGIH)</u>	<u>STEL/Ceiling (ACGIH)</u>	<u>PEL (OSHA)</u>	<u>STEL/Ceiling (OSHA)</u>
Hydrogen Peroxide	1 ppm		1 ppm	
Acetic Acid	10 ppm	15 ppm	10 ppm	
Sulfuric Acid			1 mg/m ³	3 mg/m ³ STEL

ENGINEERING CONTROLS: Provide mechanical local exhaust ventilation to prevent release of mist into the work area. If release is expected use respiratory protection.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use cup type chemical goggles. Full face shield may be used.

RESPIRATORY: Use approved acid/gas cartridge or canister with full facepiece unless break-through occurs, then use airline supplied or self contained breathing apparatus with full facepiece.

PROTECTIVE CLOTHING: Rubber or neoprene gloves and footwear. Rubber or neoprene aprons or full protection clothing.

9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR: Sharp, pungent, vinegar like odor

APPEARANCE: Colorless liquid

pH: Less than 1

PERCENT VOLATILE: 99

VAPOR PRESSURE: 20 mm Hg @ 25°C

VAPOR DENSITY: (Air = 1): Not available

BOILING POINT: About 107°C (225°F)

MELTING POINT: -44°C (-47°F)

SOLUBILITY IN WATER: (% by wgt.) @ 25°C (77°F): 100

EVAPORATION RATE: (Butyl Acetate = 1) Above 1

DENSITY: Not available

SPECIFIC GRAVITY: (H₂O=1): 1.13 @ 20°C

COEFF. OIL/WATER: Not available

ODOR THRESHOLD: Not available

OXIDIZING PROPERTIES: Strong oxidizer

COMMENTS: pH (1% solution) @ 25°C: 2-3
Self Accelerating Decomposition Temperature (SADT) > 55°C (55 gallon drum)

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Open flames, elevated temperatures, any source of heat, combustibles such as paper and wood and contamination.

STABILITY: Stable (contamination or heat could initiate decomposition).

POLYMERIZATION: Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS: Acetic acid and oxygen that supports combustion.

INCOMPATIBLE MATERIALS: Dirt, alkali, reducing agents, organics and heavy metals such as iron, copper, chromium, aluminum, cobalt and caustic.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS:

No data available for the product.

17% Peracetic Acid: Severely irritating, corrosive (rabbit) [FMC Study I83-719]

SKIN EFFECTS:

No data available for the product.

17% Peracetic Acid: Severely irritating, corrosive (rabbit) [FMC Study I83-720]

DERMAL LD₅₀:

No data available for the product.

17% Peracetic Acid: LD50 >200 mg/kg (rabbit) [FMC Study I83-721]

ORAL LD₅₀: <500 mg/kg, >50 mg/kg [FMC Study I86-935]

INHALATION LC₅₀: No data available for the product.

5% PAA: LC50 = 4080 mg/m³ (4157 ppm) (rat, 4 hr.) [FMC Reference I96-2138]

100% PAA: LC50 = 204 mg/m³ (66 ppm) (rat, 4 hr.) [FMC Reference I96-2138]

TARGET ORGANS: Eyes, skin, nose, throat, lungs

ACUTE EFFECTS FROM OVEREXPOSURE: No data available for the product. Liquid may cause severe burns and irreversible tissue damage to eyes, including blindness. Inhalation of peracetic acid vapors causes lacrimation and irritation of the mucous membranes, eyes and nasal passages.

CHRONIC EFFECTS FROM OVEREXPOSURE: No data available for the product. Product contains hydrogen peroxide. There are reports of limited evidence of carcinogenicity of hydrogen peroxide to mice administered high concentrations in their drinking water (IARC Monograph 36, 1985). However, the International Agency for Research on Cancer concludes that hydrogen peroxide could not be classified as to its carcinogenicity to humans (Group III Carcinogen).

CARCINOGENICITY

<u>Chemical Name</u>	<u>NTP Status</u>	<u>IARC Status</u>	<u>OSHA Status</u>	<u>Other</u>
Hydrogen Peroxide	Not listed	Not listed	Not listed	(ACGIH) Listed (A3, Animal Carcinogen)
Sulfuric Acid	Not listed	Listed	Not listed	Not listed (ACGIH)

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: No data available for the product.

5% Peracetic Acid: 96-hr. LC50 = 1.6 mg/L (Rainbow trout) [FMC I95-2023] 96-hr.

LC50 = 1.1 mg/L (Bluegill sunfish) [FMC I95-2029]

48-hr. EC50 = 0.73 mg/l (Daphnia magna) [FMC I95-2021]

120-hr. EC50 = 0.18 mg/L (Selenastrum, green algae) [FMC I95-2027]

CHEMICAL FATE INFORMATION: Peracetic acid is completely miscible with water. Aqueous solutions of peracetic acid hydrolyzes to acetic acid and hydrogen peroxide with a half life of 3-5 days.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dilute with at least twenty volumes of water and allow the hydrogen peroxide it contains to decompose, followed by discharge to a suitable treatment system in accordance with appropriate governmental regulations.

14. TRANSPORT INFORMATION

U.S. DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME: Organic Peroxide Type E, Liquid, (35% Peroxyacetic Acid, Stabilized)

PRIMARY HAZARD CLASS/DIVISION: 5.2, Subsidiary: 8 and 3

UN/NA NUMBER: UN 3107

PACKING GROUP: II

PLACARDS: 5.2 Organic Peroxide

LABEL: 5.2 Organic Peroxide (Sub Risk (8) Corrosive (3) Flammable)

OTHER SHIPPING INFORMATION:

DOT Marking: Organic Peroxide Type E, Liquid (35% Peroxyacetic Acid, Stabilized), UN 3107

Hazardous Substance/RQ: Not applicable

49 STCC Number: Not applicable

Material is shipped in 30 gal. (250 lb.) and 55 gal. (450 lb.) vented polyethylene containers.

SPECIAL SHIPPING NOTES: IMDG: Organic Peroxide Type E, Liquid (35% Peroxyacetic Acid, Stabilized)

IATA: Organic Peroxide Type E, Liquid (35% Peroxyacetic Acid, Stabilized)

Dike any spills. Protect against damage. Use proper personal protective equipment and positive pressure self contained breathing apparatus when handling spills or leaks.

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 311 HAZARD CATEGORY (40 CFR 370): Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370): 500 lbs.

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372): Listed (Peracetic Acid, Sulfuric Acid)

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355): Peracetic Acid: Planning Threshold = 500 lbs.; Sulfuric Acid: Planning Threshold = 1000 lbs.

SECTION 302.4 REPORTABLE QUANTITY (40 CFR 355) The following is a list of the ingredients that are listed.

<u>Chemical Name</u>	<u>RQ</u>
Peroxyacetic Acid	500 lbs.
Sulfuric Acid	1000 lbs.

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA REGULATORY (40 CFR 302.4): Listed (Acetic Acid), Category D; (Sulfuric Acid), Category C
15 % Peracetic Acid (Unlisted), RQ = 100 lbs., Ignitability, Corrosivity

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT): Listed.

<u>Chemical Name</u>	<u>Wt. %</u>	<u>RQ</u>
Acetic Acid	40	5000 lbs.
Sulfuric Acid	1	1000 lbs.

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA STATUS (40 CFR 710): Listed

RCRA STATUS: Waste No. D001 Waste No. D002

CANADA

WHMIS (WORKER HAZARDOUS MATERIALS INFORMATION SYSTEM): Product Identification No.: 3107
 Hazard Classification: Class D, Div. 2, Subdiv. B, Class E (Corrosive), Class C (Oxidizer), Class B (Flammable)
 Ingredient Disclosure List: Listed

16. OTHER INFORMATION**REVISION SUMMARY** Revision #: 5

This MSDS replaces the October 12, 1998 MSDS. Any changes in information are as follows:

In Section 2

Composition/Information on Ingredients

HMIS RATING

HEALTH:	3
FLAMMABILITY	2
REACTIVITY:	2
PROTECTION:	H

NFPA RATING

HEALTH:	3
FLAMMABILITY	2
REACTIVITY:	2
SPECIAL:	OX

Key

4 = Severe

3 = Serious

2 = Moderate

1 = Slight

0 = Minimal

HMIS RATINGS NOTES: Protection = H (Safety goggles, gloves, apron and a vapor respirator)

GENERAL STATEMENTS: NFPA - Class III Organic Peroxide

The contents and format of this MSDS are in accordance with OSHA Hazard Communication Standard and Canada's Workplace Hazardous Information System (WHMIS).

Section(s) Revised : New Format

National Fire Protection Association (NFPA)

SPECIAL = OX (Oxidizer)

Hazardous Materials Identification System (HMIS)

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OCTANOIC ACID
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DATE PRINTED: 9/12/1997

KORTACID 0899

SECTION 1. CHEMICAL PRODUCT AND COMPANY INFORMATION

PRODUCT NAME
KORTACID 0899**SYNONYM**
Caprylic acid**CAS #**
124-07-2**MANUFACTURERS NAME**
Akzo Nobel Chemicals Inc.**ADDRESS**
Industriestrasse 10
Emmerich, 46446**COUNTRY**
GERMANY**PRODUCT USE**
Industrial & Institutional**ISSUE DATE**
10/18/1994**CHEMICAL NAME**
n-Octanoic acid**CHEMICAL FORMULA**
C7 H15 COOH**CHEMICAL FAMILY**
Fatty acid**PRODUCT/TECHNICAL INFORMATION**
1-800-906-9977**MEDICAL/HANDLING EMERGENCY**
1-914-693-6946**TRANSPORTATION EMERGENCY**
CHEMTREC 1-800-424-9300**REVISION DATE**
7/23/1996**REVISION NO.**
004

SECTION 2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE DESCRIPTION	PERCENT	CAS#
Octanoic acid	98.000-100.000	124-07-2
Hexanoic acid	0.001- 2.000	142-62-1
Decanoic acid	0.001- 2.000	334-48-5

SECTION 3. HAZARDS IDENTIFICATION

Appearance & Odor

Clear, yellow liquid with a slight, unpleasant, rancid odor.

STATEMENT OF HAZARDS**DANGER!**
CAUSES SKIN AND EYE BURNS.**Fire & Explosion Hazards**

This product is not defined as flammable or combustible. However, under fire conditions it may support combustion and decompose to give off toxic materials such as carbon monoxide and carbon dioxide. This product is not sensitive to static discharge.

Primary Route of Exposure

Skin and eye contact are the primary routes of exposure to this product.

Inhalation Acute Exposure

Due to it's low vapor pressure, this product is not likely to present an inhalation hazard at normal temperatures. At elevated temperatures, vapors may cause irritation of the respiratory tract.

Skin Contact - ACUTE

Skin contact can cause severe irritation or burns with redness, swelling, and blistering.

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SECTION 3. HAZARDS IDENTIFICATION
(CONTINUED)**Eye contact - ACUTE**

Eye contact can cause severe irritation or burns. May cause permanent eye damage if not flushed out immediately.

Ingestion - ACUTE

Ingestion of this material can cause severe irritation or burns of the mouth, throat, esophagus, and stomach.

CARCINOGENICITY

IARCNO	OSHANO
NTPNO	ACGIHNO

SECTION 4. FIRST AID MEASURES

Inhalation First Aid

Inhalation is unlikely; however, if it does occur, remove victim to fresh air. If not breathing, give artificial respiration. If breathing is difficult, administer oxygen. Get medical attention.

Skin Contact - First Aid

Immediately remove contaminated clothing and shoes. Remove material from skin by patting or blotting with a clean cloth. DO NOT WIPE OR RUB MATERIAL FROM SKIN. Flush remaining material from skin with water, and then wash skin thoroughly with soap and plenty of water for at least 15 minutes. Do not attempt to neutralize with chemical agents. Get medical attention. Wash contaminated clothing before reuse. Thoroughly clean contaminated shoes before reuse or discard as necessary.

Eye Contact - First Aid

Immediate first aid is required to prevent eye damage. If victim is wearing contact lenses, remove them. Take care not to contaminate the victim's healthy skin and eyes. Immediately flush the eye(s) with large quantities of running water for a minimum of 15 minutes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids with water. DO NOT let the victim rub the eyes. Do not attempt to neutralize with chemical agents. Obtain medical attention immediately. Oils and ointments should not be used at this time. Continue flushing with water or normal saline solution, if available, for an additional 15 minutes if a physician is not immediately available.

Ingestion - First Aid

DO NOT induce vomiting. If victim is conscious and alert, give plenty of water to drink. Call a physician or a poison control center immediately. If vomiting occurs, keep head below hips to reduce risk of aspiration. Give victim water again. Never give anything by mouth to a person who is unconscious or convulsing. Get medical attention immediately.

Medical conditions aggravated

There are no data available that address medical conditions that are generally recognized as being aggravated by exposure to this product.

Note to Physician

Attending physician should treat exposed patients symptomatically. Chemical burns on the skin should be treated as thermal burns. Skin reactions may take 24-48 hours to develop. Flush eyes with buffered or plain irrigating solutions. If any ulceration or conjunctival injury is present, have an ophthalmologist examine the patient. Iced water helps relieve pain and swelling of both the skin and eyes.

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SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT
269.60 F 132.00 CFLASH METHOD
Pensky-Martens Closed CupAUTO IGNITION TEMPERATURE
572.00 F 300.00 C
Greater thanUPPER EXPLOSION LIMIT
N/DLOWER EXPLOSION LIMIT
N/D**Extinguishing Media**

Use water spray, dry chemical, carbon dioxide, or foam extinguishing agents. Direct application of high pressure water streams may splatter burning material.

Fire Fighting Procedures

As in any fire, prevent human exposure to fire, smoke, fumes, or products of combustion. Evacuate non-essential personnel from the fire area. Firefighters should wear positive pressure/pressure demand, self-contained breathing apparatus and impervious protective clothing. If possible remove containers from the fire area. Keep fire exposed containers cool with a water fog or spray to prevent rupture due to excessive heat. High pressure water may spread product from broken containers increasing contamination or fire hazard. Dike fire water for later disposal. Do not allow contaminated water to enter waterways.

Fire & Explosion Hazards

This product is not defined as flammable or combustible. However, under fire conditions it may support combustion and decompose to give off toxic materials such as carbon monoxide and carbon dioxide. This product is not sensitive to static discharge.

Other Fire + Explosion Hazards

No other explosion hazards of this product are known.

Hazardous Products/Combustion

Thermal decomposition of this product may produce toxic oxides of carbon.

NFPA HEALTH RATING

3

NFPA FLAMMABILITY RATING

1

NFPA REACTIVITY RATING

0

NFPA OTHER

ND

SECTION 6. ACCIDENTAL RELEASE MEASURES

Cleanup

Isolate spill area and restrict non-essential personnel from area. All personnel involved in spill cleanup should follow good industrial hygiene practices. Wear protective clothing to prevent eye and skin contact. Use adequate ventilation and/or wear a NIOSH-approved organic vapor respirator with dust, mist, and fume filter to minimize inhalation exposure. Stop source of spill if this is possible without being injured.

If the material is in a liquid phase, small spills should be absorbed with a suitable, inert material (e.g., sand or earth). Remove the absorbed material and place in an appropriate chemical waste container for disposal. Flush the spill area with detergent and water.

Large spills should be diked to prevent spreading. Pump spilled

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SECTION 6. ACCIDENTAL RELEASE MEASURES
(CONTINUED)

material to salvage according to a predetermined plan. Remove residual material and flush spill area with detergent and water.

SECTION 7. HANDLING AND STORAGE
-----**Handling**

Wear protective equipment when handling this product to prevent eye and skin contact.

Use approved equipment for transport of containers to avoid puncturing or rupturing containers. Do not use air pressure to empty containers.

Emptied container may retain product residues. Follow all warnings and precautions even after container is emptied.

Storage

Store away from foodstuffs or animal feed. Containers should be stored in a cool, dry, well-ventilated area away from strong bases and strong oxidizers. Containers which have been opened should be tightly closed when returned to storage. If outdoor storage is unavoidable, containers should be placed in an area shielded from the sun and other elements. Exercise due caution to prevent damage to or leakage from the container.

MAXIMUM STORAGE TEMPERATURE

122.00 F 50.00 C
for bulk material

General Comments

It is recommended that drums be kept sealed if stored for any length of time, and resealed if only a portion of the contents are used. If fatty acids are to be stored in tanks for long durations it may be advisable to blanket them with an inert gas such as nitrogen.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
-----**Respiratory protection**

Respiratory protection generally is not required; however, if use conditions (e.g., elevated temperature) generate vapors or mist, use NIOSH-approved organic vapor/acid gas respirator with dust, mist and fume filter to reduce potential for inhalation exposure. Where exposure potential necessitates a higher level of protection, use a NIOSH-approved, positive-pressure/pressure-demand, air-supplied respirator.

Respirator cartridges or canisters must be changed frequently (following each use or at the end of the workshift) to assure breakthrough exposure does not occur.

Skin Protection

Skin contact with this product should be prevented through the use of suitable protective clothing, gloves, and footwear selected with regard for use condition exposure potential. Protective equipment made of neoprene or nitrile rubber is recommended.

Eye Protection

Eye contact with this product may cause severe irritation or chemical burns of the eyes, and possibly permanent eye damage. Chemical goggles and/or a face shield must be worn when handling this product.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
(CONTINUED)**Ventilation protection**

Special ventilation is usually not required under normal use conditions. General plant ventilation should be adequate in most cases.

Other Protection

Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather. Long sleeved clothing may be used to minimize skin contact.

APPLICABLE EXPOSURE LIMITS

Other than any exposure limits which may be displayed in Section 8, there are no other known exposure limits applicable to this product or its components.

EXPOSURE LIMITS/REGULATORY INFORMATION
(IN MG/M3)

SUBSTANCE DESCRIPTION	REG. AGCY	PEL	TLV	TWA	STEL	CEIL
Octanoic acid	OSHA	N/D	N/D	N/D	N/D	N/D
	ACGIH	N/D	N/D	N/D	N/D	N/D
	NIOSH	N/D	N/D	N/D	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D
Hexanoic acid	OSHA	N/D	N/D	N/D	N/D	N/D
	ACGIH	N/D	N/D	N/D	N/D	N/D
	NIOSH	N/D	N/D	N/D	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D
Decanoic acid	OSHA	N/D	N/D	N/D	N/D	N/D
	ACGIH	N/D	N/D	N/D	N/D	N/D
	NIOSH	N/D	N/D	N/D	N/D	N/D
	SUPPLIER	N/D	N/D	N/D	N/D	N/D

LEGEND:

EXPOSURE LIMIT DESCRIPTIONS
 CEIL Ceiling Exposure Limit
 PEL Permissible Exposure Limit
 STEL Short Term Exposure Limit
 TLV Threshold Limit Value
 TWA Time Weighted Average
 N/D - Not Determined

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SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

VAPOR PRESSURE (mm Hg)
LT 1 @ 20 CVAPOR DENSITY (Air = 1.0)
N/DEVAPORATION RATE
LT 1 Butylacetate = 1VOLATILE X
AP 1 % by weightBOILING POINT
462.20 F 239.00 C
at 760 mmHg (minimum)ODOR THRESHOLD (ppm)
N/DSPECIFIC GRAVITY
EQ .909 @ 20 CBULK DENSITY
N/DSOLUBILITY IN WATER
.. Practically insolubleSOLUBILITY IN OTHER SOLVENTS
Soluble in most organic solv.COEFFICIENT OF OIL/WATER
N/DPOUR POINT
68.00 F 20.00 C
ApproximatelyMELTING POINT
60.80 F 16.00 C
ApproximatelypH FACTOR
AP 3-4CLOUD POINT
N/D F N/D CFLASH POINT
269.60 F 132.00 CFLASH METHOD
Pensky-Martens Closed CupUPPER EXPLOSION LIMIT
N/DLOWER EXPLOSION LIMIT
N/DAUTO IGNITION TEMPERATURE
572.00 F 300.00 C
Greater thanOther
Viscosity @ 20 C = 5.8 mPa.s

SECTION 10. STABILITY AND REACTIVITY

Stability

This product is stable at ambient temperatures and atmospheric pressures. It is not self-reactive and has a shelf life of greater than one year under sealed conditions. It is not sensitive to physical impact or static discharge.

Incompatibilities

This product is incompatible with strong bases and strong oxidizers.

Polymerization

Hazardous polymerization is not expected to occur.

Decomposition

Under non-oxidizing conditions and when subjected to temperatures in excess of 300 C, this material will decompose into hydrocarbons, carbon monoxide and carbon dioxide.

Conditions to Avoid

Contact with strong bases and strong oxidizers and prolonged storage at elevated temperatures should be avoided.

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SECTION 11. TOXICOLOGICAL INFORMATION

Toxicological - Inhalation

Inhalation toxicity data are not available for this product or its components. Because of its low vapor pressure, significant amounts of airborne vapors are not expected at normal room temperatures. However, use at elevated temperatures may generate vapors which are irritating to the respiratory tract.

Inhalation Chronic Exposure

Chronic inhalation exposure effects of this product are not known. However, it may cause irritation of the respiratory tract.

Toxicological - Dermal

The acute dermal LD50 (rabbit) is > 2000 mg/kg. This material is considered severely irritating and corrosive to skin.

Skin Contact - CHRONIC

Chronic dermal exposure effects for this product are not known. However, prolonged or repeated contact can cause severe skin irritation or burns with redness, swelling and blistering.

Toxicological - Eye

While this product has not been tested, it is expected to be severely irritating and corrosive to eyes based on animal tests with similar products.

Toxicological - Ingestion

The acute oral LD50 (rat) for this material is > 2000 mg/kg. This material is considered severely irritating and corrosive to tissue. Ingestion is expected to cause severe irritation or chemical burns of the mouth, throat, esophagus and any parts of the gastrointestinal system that come in contact with this material.

Ingestion - CHRONIC

Chronic ingestion effects of this product are not known. However, ingestion can result in severe irritation or burns of the mouth, throat, esophagus and stomach.

CARCINOGENICITY/MUTAGENICITY

The carcinogenic/mutagenic properties of this material are not known.

Neither this material nor its components is classified as a carcinogen or suspect carcinogen by IARC, NTP, OSHA, or ACGIH.

REPRODUCTIVE EFFECTS

The reproductive toxicity of this product is not known.

NEUROTOXICITY

The neurotoxic effects of this product are not known.

Other Toxicological Effects

No other toxic effects for this product are known.

Target Organs

Overexposure to this product may affect the skin and eyes.

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SECTION 12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

The ecological toxicity of this product is not known.

DISTRIBUTION

Other ecological information on this product is not known.

CHEMICAL FATE

This product is readily biodegradable.

SECTION 13. DISPOSAL CONSIDERATIONS

Waste Disposal

Material that cannot be used or chemically reprocessed and empty containers except those designed for multiple use (returnable), should be disposed of in accordance with all applicable regulations. Product containers designed for single use should be thoroughly emptied before disposal. Multiple use containers should be thoroughly emptied before returning to the shipping point.

NOTE] State and local regulations may be more stringent than federal.

This product, if unused, does not meet the RCRA criteria for being identified as a hazardous waste by characteristics. Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations.

CONTAINER DISPOSAL

Containers should be cleaned of residual product before disposal. Do not contaminate public waters with waste or rinsate. Empty containers should be disposed of in accordance with all applicable laws and regulations.

SECTION 14. TRANSPORT INFORMATION

SHIPPING DESCRIPTION

CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S.
(Fatty Acids)
UN 3265
Hazard Class: 8; Packing Group: III
Emergency Response Guide No. 153

REQUIRED LABELS

Corrosive

ENVIRON. HAZARDOUS SUBSTANCE

This product does not contain an environmentally hazardous substance per 49 CFR 172.101, Appendix B.

SECTION 15. REGULATORY INFORMATION

Component Octanoic acid is subject to the following

Environmental List

DSL Domestic Substance List-Canada
TSCA Toxic Subst. Cont. Act -listed

Akzo Nobel Chemicals Inc.

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SECTION 15. REGULATORY INFORMATION
(CONTINUED)

Component Hexanoic acid is subject to the following

Environmental List

DSL	Domestic Substance List-Canada
MA, LIST	Massachusetts Substance List
NJ R-T-K	New Jersey R-T-K Hazard. Sub.
PA, LIST	Penn. Hazardous Substance List
TSCA	Toxic Subst. Cont. Act -I-listed

Component Decanoic acid is subject to the following

Environmental List

DSL	Domestic Substance List-Canada
TSCA	Toxic Subst. Cont. Act -I-listed

OTHER REGULATORY INFORMATION

No other regulatory information is available on this product.

WHMIS HAZARD CLASS
D-2B, E

HAZARD RATING SOURCE
HMIS

HEALTH
3

REACTIVITY
0

FLAMMABILITY
1

OTHER

SECTION 16. OTHER INFORMATION

OTHER INFORMATION

KORTACID is a registered trademark of Akzo Nobel Chemicals Inc.

CREATED BY
PRODUCT SAFETY 914/674-5000

KEY TO ABBREVIATIONS:

EQ=Equal
AP=Approximately

LT=Less Than
TR=Trace

GT=Greater Than
ND=No Data available

All information concerning this product and/or suggestions for handling and use contained herein are offered in good faith and are believed to be reliable. Akzo Nobel Chemicals Inc.; however, makes no warranty as to the accuracy or sufficiency of such information and/or suggestions, as to the product's merchantability or fitness for any particular purpose, or that use suggested will not infringe any patent. Nothing contained herein shall be construed as granting or extending any license under any patent. Buyer must determine for himself, by preliminary tests or otherwise, the suitability of this product for his purposes. The information contained herein supersedes all previously issued bulletins on the subject matter covered.

RETURN TO MENU

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**PEROXYOCTANOIC ACID
MATERIAL SAFETY DATA SHEET**

Ecolab Inc.
Ecolab Center, St. Paul MN 55102
Product Information: 1-651-293-4255 Issue Date: October 22, 1999

1.0 IDENTIFICATION /

- 1.1 Product Name: PEROXYOCTANOIC ACID
1.2 Product Type: Aliphatic Peroxide
1.3 Hazard Rating: Health: 2 Fire: 0 Reactivity: 1

Substances Subject to SARA 313 Reporting Are Indicated by "#"

2.0 HAZARDOUS COMPONENTS /

- | | CAS No. | (mg/m3) | |
|--------------------------|------------|---------|-----|
| | | PEL | TWA |
| 2.1 Peroxyoctanoic acid* | 33734-57-5 | No | No |
- *this material exists only in an equilibrium state with octanoic acid and hydrogen peroxide. It is not isolated in a pure form. This MSDS presents information based on the best scientific evidence available, not on actual product testing.

PEL = OSHA 8 hour average in air TWA = ACGIH 8 hour average in air

3.0 PHYSICAL DATA /

- 3.1 Appearance: Waxy white solid
3.2 Solubility in Water: Slightly soluble
3.3 pH: 3 - 4 (estimated pH of aqueous solution)

4.0 FIRE AND EXPLOSION DATA /

- 4.1 Special Fire Hazards: Decomposition of product releases oxygen which may intensify fire. See Section 5. Oxidizer.
4.2 Fire Fighting Methods: Flood fire-exposed containers to cool them.

5.0 REACTIVITY DATA /

- 5.1 Stability: Heat or contaminants can cause decomposition of product. Store in a cool area.
5.2 Conditions to Avoid: Avoid excessive heat, organic contaminants of any kind, contact with iron or copper.

6.0 SPILL OR LEAK PROCEDURES / WEAR PROPER PROTECTIVE EQUIPMENT

- 6.1 Cleanup: Sweep up using inert material (earth, sand, etc.)

Product: PEROXYOCTANOIC ACID

Ecolab Inc.

MEDICAL EMERGENCY ONLY, 24 HOUR SERVICE: 1-800-328-0026

7.0 HEALTH HAZARD DATA /

WARNING

7.1 Effects of Overexposure to Concentrate:

Eyes: Causes severe irritation or eye damage.

Skin: Causes severe irritation or skin damage.

If Swallowed: May be harmful or fatal if swallowed.

8.0 FIRST AID /

8.1 Eyes: Flush at once with cool running water. Remove contact lenses and continue flushing for 15 minutes, holding eyelids apart so as to rinse entire eye. CALL A PHYSICIAN IMMEDIATELY.

8.2 Skin: Immediately wash with plenty of soap and water. Get medical attention. Remove and wash contaminated clothing before reuse.

8.3 If Swallowed: Rinse mouth at once; then drink 1 or 2 large glasses of water. DO NOT induce vomiting. NEVER give anything by mouth to an unconscious person.

IMMEDIATELY CALL THE MEDICAL EMERGENCY NUMBER, 1-800-328-0026,
A POISON CONTROL CENTER, OR A PHYSICIAN

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

9.0 PROTECTIVE MEASURES /

9.1 FOR CONCENTRATE:

Eyes: Wear chemical splash goggles.

Skin: Wear any industrial rubber gloves, synthetic apron, other protective equipment as necessary to prevent skin contact. Wash well after handling product.

Respiratory: Avoid breathing mists or vapors of this product.

10.0 ADDITIONAL INFORMATION /

10.1 Purpose of 10/24/1999 issue: First issue. This MSDS provides information on a non-isolated component in a finished product. This document prepared for product evaluation by regulatory authorities.

KEEP OUT OF REACH OF CHILDREN

The above information is believed to be correct with respect to the formula used to manufacture the product. As data, standards, and regulations change, and conditions of use and handling are beyond our control, NO WARRANTY, EXPRESS OR IMPLIED, IS MADE AS TO THE COMPLETENESS OR CONTINUING ACCURACY OF THIS INFORMATION.

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HEDP
MATERIAL SAFETY DATA SHEET

Monsanto MSDS Name: DEQUEST® 2010 DEFLOCCULANT AND SEQUESTRANT (002809214)



Monsanto

Material Safety Data Sheet

PRODUCT NAME: DEQUEST® 2010 DEFLOCCULANT AND SEQUESTRANT

MONSANTO COMPANY, 800 N. LINDBERGH BLVD., ST. LOUIS, MO 63167

FOR CHEMICAL EMERGENCY, SPILL LEAK, FIRE, EXPOSURE, OR ACCIDENT
Call CHEMTREC - Day or Night - 1-800-424-9300 Toll free in the continental U.S., Hawaii, Puerto Rico, Canada, Alaska, or Virgin Islands. For calls originating elsewhere: 703-527-3887 (collect calls accepted)

For additional non-emergency information, call: 314-694-6661

PRODUCT IDENTIFICATION

Synonym(s):	HEDP; 1-Hydroxyethylidene-1,1-diphosphonic acid, etidronic acid
Chemical Name:	Phosphonic acid, (1-hydroxyethylidene)bis-
Chemical Formula:	C(OH)(CH ₃)(PO ₃ H ₂) ₂
Chemical Family:	Phosphonates
CAS No.:	2809-21-4
TSCA Inventory:	Phosphonic acid, (1-hydroxyethylidene)bis- appears on the inventory of Chemical Substances published by the U.S. Environmental Protection Agency (EPA) under authority of the Toxic Substances Control Act (TSCA).
DOT Proper Shipping Name:	Corrosive liquid, acidic, organic, N.O.S. (contains phosphonic acid)
DOT Hazard Class/I.D. No./ Packing Group:	8/UN3265/PG III
DOT Label:	Corrosive
U.S. Surface Freight Classification:	Washing Compound, N.O.I.B.N., Liquid
Reportable Quantity (RQ) Under U.S. EPA CERCLA Regulations:	Not Applicable

SARA Hazard Notification

Hazardous Categories Under Criteria
of SARA Title III Rules

Monsanto MSDS Name: DEQUEST® 2010 DEFLOCCULANT AND SEQUESTANT (002909214)

(40 CFR Part 370):

Immediate

Section 313 Toxic Chemical(s): Not Applicable

Hazardous Chemical(s) Under OSHA Hazard Communication Standard:

This product contains, as components, the substances listed below which are identified as hazardous chemicals under the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200):

1-Hydroxyethylidene-1,1-diphosphonic acid, CAS Reg. No. 2809-21-4

Phosphorous Acid, CAS Reg. No. 10294-56-1

WARNING STATEMENTS

DANGER!

CAUSES EYE BURNS

CORROSIVE TO MILD STEEL

PRECAUTIONARY MEASURES

Do not get in eyes, on skin or clothing.

Avoid breathing vapor or mist.

Keep container closed.

Use with adequate ventilation.

Wash thoroughly after handling.

Emptied container retains vapor and product residue. Observe all labeled safe-guards until container is cleaned, reconditioned or destroyed.

EMERGENCY AND FIRST AID PROCEDURES

FIRST AID: IF IN EYES, immediately flush with plenty of water for at least 15 minutes. Get medical attention. Remove material from skin and clothing.

IN CASE OF: SPILL OR LEAK, contain spills and leaks to prevent discharge to the environment.

OCCUPATIONAL CONTROL PROCEDURES

Eye Protection: Where there is potential for eye contact, wear chemical goggles and have eye flushing equipment immediately available.

Skin Protection: Although Dequest 2010 does not present a significant skin concern, skin contamination should be minimized by following good industrial practice. Wearing of protective gloves is recommended. Wash hands and contaminated skin after handling.

Respiratory Protection: Avoid breathing vapor or mist. Use NIOSH/MSHA approved respiratory protection equipment (full facepiece recommended) when airborne exposure is excessive. If used, full facepiece replaces need for chemical goggles. Consult respirator manufacturer to determine appropriate type equipment for given application. The respirator use limitations specified by NIOSH/MSHA or the manufacturer must be observed. Respiratory protection programs must be in compliance with 29 CFR 1910.134.

Ventilation: Provide ventilation to minimize exposure. Use local mechanical exhaust ventilation at sources of air contamination such as open process equipment.

Monsanto MSDS Name: DEQUEST® 2010 DEFL OCCULANT AND SEQUESTRANT (002809214)**Airborne Exposure Limits:****DEQUEST 2010**

OSHA PEL:	None established
ACGIH TLV:	None established

Components:**1-Hydroxyethylidene-1,1-diphosphonic acid (typically 60% by weight of product)**

OSHA PEL:	None established
ACGIH TLV:	None established

Phosphorous Acid (typically 3% by weight of product)

OSHA PEL:	None established
ACGIH TLV:	None established

FIRE PROTECTION INFORMATION

Although this material does not meet the parameters for flammability, it will burn in the presence of a strong ignition source after the water is removed.

Extinguishing Media: Water spray, dry chemical, CO₂, or other Class B extinguishing agent.

Special Firefighting Procedures: When DEQUEST 2010 is involved in a fire, firefighters or others should wear full protective clothing and self-contained breathing apparatus if exposed to vapors or products of combustion. All fire fighting equipment, including protective clothing and self-contained breathing apparatus, needs to be decontaminated after use.

REACTIVITY DATA

Materials to Avoid: Avoid contact with concentrated caustic. Contact will result in the evolution of heat. Also, avoid contact with strong oxidizing agents.

Hazardous Decomposition Products: Phosphines may form after all the water has been removed. CO, CO₂, and oxides of phosphorus may also be formed.

Hazardous Polymerization: Does not occur.

Incompatibility: Severely corrosive to steel based on DOT, 49 CFR criteria.

HEALTH EFFECTS SUMMARY

The following information summarizes human experience and results of scientific investigations reviewed by health professionals for hazard evaluation of DEQUEST 2010 Deflocculant and Sequestrant and development of Precautionary Statements and Occupational Control Procedures recommended in this document.

Effects of Exposure

Skin contact is expected to be the primary route of occupational exposure to DEQUEST 2010 Deflocculant & Sequestrant. Though occupational exposure to this material has not been reported to cause significant adverse health effects, DEQUEST 2010 deflocculant is considered, on the basis of acute animal tests, to be corrosive to the eyes.

Monsanto MSDS Name: DEQUEST® 2010 DEFLOCCULANT AND SEQUESTRANT (002809214)Toxicological Data

Data from Monsanto studies indicate the following:

Oral -	Slightly Toxic	(Rat LD50: 2400 mg/kg)
Dermal -	Practically Nontoxic	(Rabbit LD50: >7940 mg/kg)
Eye Irritation -	Corrosive	
Skin Irritation -	Nonirritating	(Rabbit, 24 hr., 0.0/8.0)

Following repeated exposures (90 days) to DEQUEST 2010 deflocculant (usually as the sodium salt) in their feed, rats showed minor changes in one study and no adverse effects in another; dogs dosed orally (30 days) also showed only minor changes in one study but not in another. Rats given this material in the diet for 2 years had only minor changes to the adrenal gland which may not have been related to treatment. Dogs given the test material in the diet for 2 years developed an anemia which corrected itself during the study. However dogs given the test material by injection under the skin or by direct oral dosing (capsules) developed severe effects on the bone, with rib and pelvic fractures reported in many of the animals.

No birth defects were noted in rats or rabbits given DEQUEST 2010 deflocculant (as the sodium salt) orally during pregnancy. No effects were seen on the ability of male and female rats to reproduce when given DEQUEST 2010 deflocculant (as the sodium salt) in their diet for 2 successive generations.

DEQUEST 2010 deflocculant produced no genetic changes in standard *in vitro* assays using bacterial and mammalian cells.

Components

Data from laboratory studies conducted by Monsanto and from the scientific literature on phosphoric acid, a component of DEQUEST 2010 Deflocculant which have been identified under the criteria of the OSHA Hazards Communication Standard (29 CFR 19190.1200):

Phosphorous Acid

Phosphorous acid is considered to be slightly toxic following oral administration to rats and dermal administration to rabbits. It is corrosive to eyes and skin and, thus, may contribute to the irritation potential of DEQUEST 2010 deflocculant. Phosphorus acid produced no genetic changes in standard tests using bacteria.

Additional Information

Hydroxyethylidene-1,1-diphosphonic acid (HEDP), the active acid in DEQUEST 2010 Deflocculant, has established therapeutic application in treatment of certain bone related diseases due to its ability to alter the development of the bone mineral matrix. Many clinical observations on the use of HEDP in bone disease and skeletal imaging have been published. Additional publications extensively discuss the effects of HEDP on bone mineralization and on calcium and phosphate metabolism in man and laboratory animals. For additional toxicity information relative to these uses, please refer to the appropriate scientific literature.

PHYSICAL DATA

Appearance:	Clear solution, yellow color
Odor:	Characteristic odor
Freezing Point:	0C (<32F) -22_C (-13_F)

Monsanto MSDS Name: DEQUEST® 2010 DEFFLOCCULANT AND SEQUESTRANT (002809214)

Specific Gravity @ 20C/15C: 1.45

Viscosity (centistokes) @ 20C: 46.01
 @ 40C: 20.20
 @ 60C: 10.27
 @ 90_C: 4.96

pH (1% solution @ 25C): <2

Solubility in Water: Capable of being mixed (miscible) in all proportions

NOTE: These physical data are typical values based on material tested by may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specification for the product.

SPILL, LEAK, & DISPOSAL INFORMATION

Emergency Spill and Leak Information: When handling spills and leaks, follow good industrial hygiene and safety practices as outlined in the Precautionary Measures and Emergency and First Aid Procedures section of this document. Contain spills and leaks to prevent discharge to the environment. Absorb spillage with clay, sawdust or other absorbent material. Place all spilled material, contaminated sorbent materials, contaminated dirt, and other contaminated material in drums. If possible, it is also acceptable to contain spilled material and recover it as a liquid prior to disposal.

Keep concentrated product out of sewers, watersheds and water systems.

Disposal Information: Dispose of in accordance with all applicable local, state and federal regulations.

As currently defined in the federal Resource Conservation & Recovery Act (RCRA), DEQUEST 2000 defloculant and sequestrant, when discarded, is a hazardous waste exhibiting the characteristic of corrosivity (D-002). See 40 CFR 261.22. Its disposal, therefore, is regulated by federal RCRA regulations. Consult your attorney or appropriate regulatory officials for information regarding additional state and local waste disposal requirements. Disposal by incineration is recommended.

ENVIRONMENTAL EFFECTS

Environmental Toxicity Information:

	96-hr	14-day
Algae* EC50	3 mg/L	39 mg/L
<u>Invertebrates</u>		
Daphnia magna 48-hr EC50, 527 mg/L:		Practically NonToxic
Midge Larvae 48-hr LC50, 8,910 mg/L:		Practically NonToxic
Grass Shrimp 96-hr LC50, 1,770 mg/L:		Practically NonToxic
Oyster Shell Deposition 96-hr EC50, 89 mg/L:		Slightly Toxic
<u>Fish</u>		
Bluegill Sunfish 96-hr LC50, 868 mg/L:		Practically NonToxic
Rainbow Trout 96-hr LC50, 368 mg/L:		Practically NonToxic
Channel Catfish 96-hr LC50, 695 mg/L:		Practically NonToxic
Sheepshead Minnow 96-hr LC50, 2,180 mg/L:		Practically NonToxic
Rainbow Trout 14-day LC50, 180 mg/L		
<u>Birds</u>		
Mallard Duck Oral LD50, >2,510 mg/kg:		Practically NonToxic

Monsanto MSDS Name: DEQUEST® 2010 DEFLOCCULANT AND SEQUESTRANT (002809214)

Bobwhite Quail Oral LD50, >2,510 mg/kg: Practically NonToxic

Daphnia magna were exposed to DEQUEST 2010 concentrations ranging from 3.37 to 400 mg/L for 28 days. Reductions in adult Daphnia survival and reproduction were observed at concentrations above 25 mg/L. The maximum acceptable toxicant concentration was greater than 12.5 mg/L and less than 25 mg/L.

Carp were continuously exposed to radiolabeled active acid of DEQUEST 2010 at nominal concentrations of 0.058 and 0.55 mg/L for 49 days, after which remaining fish were transferred to DEQUEST-free water for 14 days. Tissue residue analysis determined that radiolabeled active acid of DEQUEST 2010 did not bioconcentrate in the edible tissues. Radiolabeled residues did accumulate in the non-edible tissues (viscera including ingesta and fecal material). Elimination of the residues from the non-edible tissues of the carp was rapid and extensive after transfer to DEQUEST-free water.

When evaluated in a microbial biodegradation assay, DEQUEST 2010 biodegradation to CO₂ was classified as slow to intermediate.

* Algae growth inhibition due to the ability of DEQUEST to complex nutrients, not toxicity per se.

NOTE: All values are "mg active acid/liter".

For additional information on this product refer to Monsanto Product Bulletin on DEQUEST 2010 deflocculant and sequestrant.

DEQUEST® is a registered trademark of Monsanto Company

DATE: 8/27/96

SUPERSEDES: 11/19/93

MSDS NUMBER 002809214

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, Monsanto Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Monsanto Company be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

RETURN TO MENU

MSDS Briquest ADPA-60A

250062
Page 1 of 10**MATERIAL SAFETY DATA SHEET****ALBRIGHT
& WILSON**
Americas

Date-Issued: 01/29/1996

MSDS Ref. No: PSMSD-211

Date-Revised: 08/22/1997

Revision No: 1

Briquest ADPA-60A

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Briquest ADPA-60A

GENERAL USE: Cleaning Agent

PRODUCT CODE: 211

PRODUCT FORMULATION NAME: 1-Hydroxyethane-1,1-Diphosphonic Acid.

CHEMICAL FAMILY: Organic Phosphonates

GENERIC NAME: HEDP

MANUFACTURER

Albright & Wilson Americas Inc.

Specialty Chemicals Division

P.O. Box 4439

Glen Allen, VA 23058-4439

Contact: Product Stewardship Department

Product Stewardship: (804) 968-6496

Transportation: (804) 968-6418

COMMENTS: To the best of our knowledge, this Material Safety Data Sheer conforms to the requirements of US OSHA 29 CFR 1910.1200, 91/155/EEC and Canadian Hazardous Products Act.

**24 HR. EMERGENCY
TELEPHONE NUMBERS**

CHEMTREC (800) 424-9300

Canutec (613) 996-6666

Emergency Phone (803) 554-1229

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Wt. %	CAS Registry #	EINECS #
Phosphonic acid, (1-hydroxyethylidene)bis-	~60	2809-21-4	220-552-8

EEC LABEL SYMBOL AND CLASSIFICATIONR 41: Risk of serious danger to eyes.
R 38: Irritating to skin.

EEC Corrosive - "C"

COMMENTS:<http://home.awamericas.com/msdsdata/1250NKM0.htm>

8/25/97

000555

MSDS Briquest ADPA-60A

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Product composition ranges shown are typical values for health, safety and environmental use and are not intended as specifications.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Clear, colorless aqueous solution with slight characteristic odor.

IMMEDIATE CONCERNS: DANGER! Causes eye burns and skin irritation.

POTENTIAL HEALTH EFFECTS

EYES: Will cause corrosive effects (burns or irreversible damage) to the eyes.

SKIN: Expected to cause significant irritation to the skin.

INGESTION: Expected to cause significant irritation to the digestive tract.

INHALATION: Expected to cause significant irritation to the lungs, upper respiratory tract, and nose.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

EYES: Severe burning of the eyes.

SKIN: Redness and possible burning of the skin.

INGESTION: Possible nausea and/or vomiting.

INHALATION: Coughing, burning, tightness of chest and/or shortness of breath.

ACUTE TOXICITY:

Not expected to cause significant adverse effects if absorbed through the skin.

Not expected to cause significant adverse effects if ingested.

No test data is available for acute inhalation toxicity.

CARCINOGENICITY:

Not Listed by NTP

Not listed by IARC

Not listed by OSHA

MUTAGENICITY:

Not Available

REPRODUCTIVE TOXICITY

REPRODUCTIVE EFFECTS: Not Available

TERATOGENIC EFFECTS: Not Available

MEDICAL CONDITIONS AGGRAVATED: Possibly skin diseases or anemia.

TARGET ORGAN STATEMENT: Contains material which may cause blood, bone, gastrointestinal tract, and respiratory tract effects based on animal data.

MSDS Briquest ADPA-60A

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SENSITIZATION: Not Available**COMMENTS:** For detailed toxicological information see Section 11.

4. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for two to three minutes. Remove any contact lenses and continue flushing for 15 minutes. Get immediate medical attention.**SKIN:** Remove contaminated clothing including shoes and immediately wash affected area with plenty of soap and water. Seek immediate medical attention. Wash contaminated clothing and shoes before reuse.**INGESTION:** Wash out mouth with water and keep at rest. Seek immediate medical attention.**INHALATION:** Remove from further exposure. Keep warm and at rest. If cough or other symptoms develop, seek medical attention.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: Not Available**FLAMMABLE LIMITS:** Not Available**AUTOIGNITION TEMPERATURE:** Not Available**FLAMMABLE CLASS:** Nonflammable**FLAME PROPAGATION OR BURNING RATE OF SOLIDS:** Not Applicable**GENERAL HAZARD:** Evacuate personnel downwind of fire to avoid inhalation of irritating and/or harmful fumes and smoke.**EXTINGUISHING MEDIA:** Chemical type foam, CO₂ (Carbon Dioxide), Dry Chemical**HAZARDOUS COMBUSTION PRODUCTS:** Oxides of both carbon and phosphorus**FIRE FIGHTING PROCEDURES:** For small containers of organic substances, it should be considered if there will be less damage by allowing the material to burn to exhaustion rather than fighting the fire and risk causing environmental contamination and other problems.**FIRE FIGHTING EQUIPMENT:** Respiratory and eye protection are required for fire fighting personnel. Full protective equipment (Bunker Gear) and self contained breathing apparatus (SCBA) should be used for all indoor fires and any significant outdoor fires. For small outdoor fires, which may easily be extinguished with a portable fire extinguisher, use of a SCBA may not be required.**SENSITIVE TO STATIC DISCHARGE:** Not Available**SENSITIVITY TO IMPACT:** Not Available

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL:

Construct temporary dikes of dirt, sand, or any appropriate readily available material to prevent spreading of the material.

Wearing the appropriate personal protective equipment designated in Section 8, move the leaking container to a containment area or rotate the container so that the opening is above the liquid level.

MSDS Briquest ADPA-60A

Page 4 of 10

Absorb on diatomaceous earth or equivalent inert material. Shovel up and dispose of at an appropriate waste disposal facility according to current applicable laws and regulations, and product characteristics at time of disposal.

LARGE SPILL:

Construct temporary dikes of dirt, sand, or any appropriate readily available material to prevent spreading of the material.

Wearing the appropriate personal protective equipment designated in Section 8, close or cap valves and/or block or plug hole in leaking container and transfer to another container.

Contain material as described above and call the local fire or police department for immediate emergency assistance.

ENVIRONMENTAL PRECAUTIONS

WATER SPILL: Use appropriate containment to avoid runoff or release to sewer or waterways.

LAND SPILL: Use appropriate containment to avoid runoff or release to ground.

GENERAL PROCEDURES: Remove containers of strong oxidizers and strong bases from release area.

RELEASE NOTES: If spill could potentially enter any waterway, including intermittent dry creeks, contact the local authorities. If in the U.S., contact the US COAST GUARD NATIONAL RESPONSE CENTER toll free number 800-424-8802.

In case of accident or road spill notify:
CHEMTREC in USA at 800-424-9300
CANUTEC in Canada at 613-996-6666
CHEMTREC, other countries, at (International code)+1 202 483 7616

COMMENTS:

See Section 13 for disposal information and Section 15 for regulatory requirements. Large and small spills may have a broad definition depending on the user's handling system. Therefore, the spill category must be defined at the point of release by technically qualified personnel.

7. HANDLING AND STORAGE**HANDLING:**

Use appropriate personal protective equipment as specified in Section 8. Handle in a well ventilated area.

Handle and use in a manner consistent with good industrial/manufacturing techniques and practices.

STORAGE:

Store in unopened containers under cool and dry conditions.

Do not store with, or close to oxidizers and bases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION**EXPOSURE GUIDELINES:**

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200)

EXPOSURE LIMITS

OSHA PEL	ACGIH TLV	Supplier OEL
ppm	mg/m ³	ppm
mg/m ³	ppm	mg/m ³

<http://home.awamericas.com/msdsdata/1250NKM0.htm>

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Phosphonic acid, (1-hydroxyethylidene)bis-

TWA	NL ⁽¹⁾	NL	NL	NL	NL
STEL	NL	NL	NL	NL	NL

OSHA TABLE COMMENTS:

1. NL = Not Listed

ENGINEERING CONTROLS: Good ventilation should be sufficient to control airborne levels of material.**PERSONAL PROTECTIVE EQUIPMENT****EYES AND FACE:** Wear chemical splash goggles and face shield when eye and face contact is possible due to splashing or spraying of material.**SKIN:** Where contact is likely, wear neoprene chemical resistant gloves, a chemical suit, rubber boots, chemical safety goggles and a face shield.**RESPIRATORY:** Always wear NIOSH approved respiratory protective equipment when there may be potential for airborne exposure.**WORK HYGIENIC PRACTICES:** Facilities storing or using this material should be equipped with an eyewash facility and a safety shower. Good personal hygiene practices should always be followed.**COMMENTS:** No PEL's, TLV's or OEL's for this product or it's ingredients are listed in the current issue of ACGIH's Guide to Occupational Exposure Values nor have they been determined by the manufacturer.**9. PHYSICAL AND CHEMICAL PROPERTIES****PHYSICAL STATE:** Liquid**ODOR:** Slight characteristic**APPEARANCE:** Clear**COLOR:** Colorless**pH:** 1.0 of a 1% solution**VAPOR PRESSURE:** 17 mmHg at 20°C (68°F)**VAPOR DENSITY:** Not Available**BOILING POINT:** >100°C (212°F)**FREEZING POINT:** Not Available**MELTING POINT:** Not Available**SOLUBILITY IN WATER:** Miscible**EVAPORATION RATE:** Not Available**DENSITY:** 1.46 g/ml at 20°C (68°F)**SPECIFIC GRAVITY:** 1.46 @ 20°C/4°C**VISCOSITY:** 64 Centipoise at 20°C (68°F)

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MOLECULAR FORMULA: $C_2H_8O_7P_2$

MOLECULAR WEIGHT: 206 g/mol

COEFF. OIL/WATER: Not Applicable

10. STABILITY AND REACTIVITY

STABLE: YES

HAZARDOUS POLYMERIZATION: NO

CONDITIONS TO AVOID: Heat, Temperatures above 200 °C.

STABILITY: The product is stable under normal ambient conditions of temperature and pressure.

POLYMERIZATION: Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of both phosphorus and carbon, acids of phosphorus and phosphine.

INCOMPATIBLE MATERIALS: Strong Oxidizers
Strong bases

11. TOXICOLOGICAL INFORMATION

ACUTE

DERMAL LD₅₀: Dermal LD50(rabbit) > 10000 mg/kgORAL LD₅₀: Oral LD50(rat) > 2000 mg/kgINHALATION LC₅₀: Not Available

EYE EFFECTS: This material is corrosive to the eyes.

SKIN EFFECTS: This material is expected to cause significant irritation to the skin.

SENSITIZATION: Not Available

TARGET ORGANS: Eyes

Blood

Skin

Gastrointestinal tract

Respiratory system

Bone/Teeth

CARCINOGENICITY:

Listed by IARC - No

Listed by NTP - No

Listed by OSHA - No

MUTAGENICITY: Not Available

REPRODUCTIVE EFFECTS: Not Available

<http://home.awamericas.com/msdsdata/1250NKM0.htm>

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TERATOGENIC EFFECTS: Not Available**GENERAL COMMENTS:** Possible skeletal effects; may decrease the affinity of hemoglobin for oxygen. Fetal anomalies have been reported in mice.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL DATA: Not expected to cause significant adverse environmental impact if material reaches waterways.**ECOTOXICOLOGICAL INFORMATION:** 96 hr, LC50(rainbow trout) > 368 mg/L
48hr, EC50 (Daphnia) = 527 mg/L
LC50(algae)~10-100 mg/l, due to the nutrient chelating ability of phosphonates, these results may not accurately reflect their toxicity.
Not toxic to aquatic organisms and not suspected of long-term adverse effects in the aquatic environment**DISTRIBUTION:** Not Available

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dispose of waste at an appropriate waste disposal facility according to current applicable laws and regulations.**FOR LARGE SPILLS:** Contain material and call local authorities for emergency assistance. In consultation with the appropriate authorities, determine the disposal method or contact Albright & Wilson Americas.**PRODUCT DISPOSAL:** Dispose of at a supervised incineration facility or an appropriate waste disposal facility according to current applicable laws and regulations and product characteristics at time of disposal.**EMPTY CONTAINER:** Rinse drums with a suitable solvent and steam to remove vapors before disposal or reuse in accordance with applicable regulations.**GENERAL COMMENTS:** Refer to Section 6, Accidental Release Measures for additional information.

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME: Corrosive Liquid, Acidic, Organic N.O.S.**TECHNICAL NAME:** 1 - Hydroxyethane - 1, 1 - Diphosphonic Acid**PRIMARY-HAZARD CLASS/DIVISION:** 8**UN/NA NUMBER:** UN3265**PACKING GROUP:** II**LABEL:** Corrosive**NAERG:** 153

CANADA TRANSPORT OF DANGEROUS GOODS

PROPER SHIPPING NAME: Corrosive Liquid, Acidic, Organic N.O.S.

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TECHNICAL NAME: 1 - Hydroxyethane - 1, 1 - Diphosphonic Acid

PRIMARY HAZARD CLASS/DIVISION: 8

UN/NA NUMBER: UN 3265

PACKING GROUP: II

LABEL: Corrosive

AIR (ICAO/LATA)

PROPER SHIPPING NAME: Corrosive Liquid, Acidic, Organic N.O.S.

TECHNICAL NAME: 1 - Hydroxyethane - 1, 1 - Diphosphonic Acid

PRIMARY HAZARD CLASS/DIVISION: 8

UN/NA NUMBER: UN 3265

PACKING GROUP: II

LABEL: Corrosive

VESSEL (IMO/IMDG)

PROPER SHIPPING NAME: Corrosive Liquid, Acidic, Organic N.O.S.

TECHNICAL NAME: 1 - Hydroxyethane - 1, 1 - Diphosphonic Acid

PRIMARY HAZARD CLASS/DIVISION: 8

UN/NA NUMBER: UN 3265

PACKING GROUP: II

LABEL: Corrosive

EUROPEAN TRANSPORTATION:

ADR/RID ITEM NUMBER: 40°c

U.S. CUSTOMS HARMONIZATION NUMBER: 2931.00.90.30

15. REGULATORY INFORMATION

UNITED STATES

DOT LABEL SYMBOL AND HAZARD CLASSIFICATION



DOT Corrosive

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

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311/312 HAZARD CATEGORIES:

FIRE: NO PRESSURE GENERATING: NO REACTIVITY: NO ACUTE: YES CHRONIC: NO

313 REPORTABLE INGREDIENTS: Not Applicable

TITLE III NOTES: Not Applicable

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION, AND LIABILITY ACT)

CERCLA RQ: Not Applicable

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA REGULATORY: All intentional ingredients are listed on the TSCA Inventory.

NATIONAL RESPONSE CENTER: U.S. Coast Guard National Center telephone # 1-800-424-8802

CANADA

WHMIS HAZARD SYMBOL AND CLASSIFICATION



Corrosive, Class E

WHMIS Corrosive

WHMIS (WORKER HAZARDOUS MATERIALS INFORMATION SYSTEM): This product is WHMIS controlled.

CANADA INGREDIENT DISCLOSURE LIST: This product does not contain any known ingredient(s) on the "Ingredient Disclosure List".

CANADIAN ENVIRONMENTAL PROTECTION ACT: All intentional ingredients are listed on the DSL (Domestic Substance List).

EUROPEAN COMMUNITY

EEC LABEL SYMBOL AND CLASSIFICATION



R 41: Risk of serious danger to eyes.

R 38: Irritating to skin.

S 39: Wear eye/face protection.

S 24, S 25: Avoid contact with skin or eyes.

S 26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 28: After contact with skin, wash immediately with plenty of soap and water.

EEC Corrosive - "C"

EUROPEAN COMMUNITY REGULATORY: All intentional ingredients are listed on the European's EINECS Inventory.

MEXICO

This product is considered to be corrosive according to Mexican Standard, Instruction No. 9, ANNEX I.

STATE REGULATIONS

Not Available

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REGULATIONS**LOCAL REGULATIONS:** Not Available**16. OTHER INFORMATION****REASON FOR ISSUE:** New format with additional information.**APPROVED BY:** William T. Stewart **TITLE:** Product Stewardship Manager**INFORMATION CONTACT:** Product Stewardship Analyst**REVISION SUMMARY**

This MSDS revision number was reset to #1 and replaces the April 08, 1997 issue.

NFPA CODES**FIRE:** 1 **HEALTH:** 2 **REACTIVITY:** 1**HMS CODES****FIRE:** 1 **HEALTH:** 2 **REACTIVITY:** 1 **PROTECTION:** D**MANUFACTURER SUPPLEMENTAL NOTES:**

HAZARD WARNING! This product belongs to a chemical family that HAS BEEN TESTED in combination with Trimethylolpropane, Trimethylolpropane derived products or their corresponding Trimethylolpropane homologs for toxicity of the thermal decomposition products in the absence of flame. Products in this chemical family PRODUCED NO SIGNIFICANT ADVERSE HEALTH EFFECTS in laboratory animals. However, there is a possibility that this thermal decomposition may produce bicyclic phosphates and/or phosphites in combination with certain other phosphorus compounds. Bicyclic phosphates and phosphites have acute neurotoxic properties and may cause convulsive seizures in laboratory test animals. Follow all precautionary measures outlined in this Material Safety Data Sheet and/or contact Albright & Wilson Americas.

DATA SOURCES:

Toxicological and ecological data based on Albright & Wilson UK Limited internal study reports.
Product Health Hazard Review by Consultant Toxicologist, Dr. R. V. Blanke.

MANUFACTURER DISCLAIMER: Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control; all risks of use of the product are therefore assumed by the user. Nothing is intended as a recommendation for uses which infringe valid patents or as extending license under valid patents. Appropriate warnings and safe handling procedures should be provided to handlers and users.

RETURN TO MENU

Section H3
Environmental Fate Information

Note: component environmental fate information is separated by colored paper.

Hydrogen Peroxide

Acetic Acid

Peroxyacetic Acid

Octanoic Acid

HEDP

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**HYDROGEN PEROXIDE
ENVIRONMENTAL FATE DATA**

ENVIRONMENTAL FATE DATA RETRIEVED FROM
THE HAZARDOUS SUBSTANCES DATA BASE
SYSTEM OF THE NATIONAL LIBRARY OF MEDICINE
OR OTHER SPECIFIED SOURCES

HYDROGEN PEROXIDE
CAS RN: 7722-84-1

Natural Sources (HSDB) -

Gaseous hydrogen peroxide is recognized to be a key component and product of the earth's lower atmospheric photochemical reactions, both in a clean and polluted atmosphere. Atmospheric hydrogen peroxide is believed to be generated exclusively by gas-phase photochemical reactions. [IARC MONOGRAPHS 1972-PRESENT V36 p.291] **PEER REVIEWED**

Atmospheric Concentrations (HSDB) -

Measurements of hydrogen peroxide concentrations in the gas-phase and in cloud water were obtained in the vicinity of the USA Carolinas coast between late Jan and early Mar 1986. Gas phase concentrations, determined by a fluorometric method, were always less than 2.4 ppb and generally less than 1 ppb. Vertical profiles of hydrogen peroxide in the clear air around clouds and storm systems were highly variable. Concentrations of hydrogen peroxide in cloud water ranged from the detection limit of 0.3 μM to 112 μM , with higher values generally occurring in the vicinity of lightning activity. Hydrogen peroxide concentrations in cloud water were well below those calculated to be in Henry's law equilibrium with gas-phase concentrations of hydrogen peroxide in the cloudy air. [Barth MC et al; Tellus 41B (1): 61-9 (1989)] **PEER REVIEWED**

Routes of Exposure (HSDB) -

Inhalation of vapor or mist, ingestion, eye and skin contact. [SITTIG. HANDBOOK TOXIC HAZARD CHEM & CARCINOGEN 2 ED 1985, p. 510] **PEER REVIEWED**

Degradation (Laidler, K.J. Chemical Kinetics, 2nd. Ed., McGraw-Hill, 1965, pp 163-164 and 436) -

Decomposition of hydrogen peroxide occurs slowly in the gas phase but is catalyzed efficiently by various metal ions in solution; some metals at levels as low as 1×10^{-8} Mole/L being effective in catalyzing the decomposition of hydrogen peroxide. Also, enzymatic degradation by the enzyme catalase (which occurs in animal and microfloral species) is very efficient with a turnover number of 5,000,000 molecules H_2O_2 /minute per molecule of catalase. Thus, at a catalase level of 0.01 mMole/L (a common mid-range level for enzymatic species in organisms), approximately 5 mole/L-minute of hydrogen peroxide can be decomposed.

000566

**ACETIC ACID
ENVIRONMENTAL FATE DATA**

ACETIC ACID
CAS RN: 64-19-7

Environmental and Natural Sources (HSDB) -

Acetic acid occurs throughout nature as a normal metabolite of both plants and animals. Humans release acetic acid to the environment in a variety of waste effluents, in emissions from combustion processes, and in exhaust from gasoline and diesel engines. If released to the atmosphere, it is degraded in the vapor-phase by reaction with photochemically produced hydroxyl radicals (estimated typical half-life of 26.7 days). It occurs in atmospheric particulate matter in acetate form and physical removal from air can occur via wet and dry deposition. If released to water, acetic acid will biodegrade readily. If released to soil, it will also biodegrade readily. Evaporation from dry surfaces is likely to occur. Since acetic acid exists ubiquitously in the environment, the general population is continuously exposed to the compound. Primary routes of exposure to acetic acid are through oral consumption of foods and inhalation of air. Occupational exposure occurs through inhalation and dermal contact. (SRC)
[CITATION] **PEER REVIEWED**

It is found in unprocessed figs ... [FURIA. HDBK FOOD ADD 2ND ED 1972 , p. 226] **PEER REVIEWED**

Acetic acid ... is ... principal component of vinegars & pyroligneous acid. [FURIA. HDBK FOOD ADD 2ND ED 1972, p. 226]
PEER REVIEWED

Occurs naturally in many fruit juices and in the stems and woody parts of plants [CONSIDINE, DM. CHEMICAL AND PROCESS TECHNOLOGY ENCYCLOPEDIA, (1974) p.21] **PEER REVIEWED**

... Occurs naturally in plant and animal tissues. ... Produced by fermentation of carbohydrates or by organic synthesis. ... /SRP: Ubiquitous in the environment/ [21 CFR 184.1005 (4/1/91)] **PEER REVIEWED**

Decomposition of solid biological wastes produces acetic acid which is readily metabolized by living organisms (1); acetic acid occurs as a normal metabolite in both plants and animals (1). It occurs naturally in various vegetation (2). [(1) Abrams E.F. et al; Identification of Organic Compounds in Effluents from Industrial Sources. USEPA-560/3-75-002 p. 3 (1975); (2) Graedel T.E. et al; Atmospheric Chemical Compounds. Sources, Occurrence and Bioassay. Orlando, FL: Academic Press p. 345 (1986)]
PEER REVIEWED

Twenty-two acids in ground roast coffees and instant coffees were determined by GLC (gas liquid chromatography) of their silyl derivatives (after pre-separation by gel electrophoresis or isotachopheresis). The contribution to the total acidity (which was estimated by titration to pH 8 after cation exchange of the coffee solutions) was calculated for each individual acid. The acids contribute 67% (roast coffee) and 72% (instant coffee) to the total acidity. Citric acid (12.2% in roast coffee/10.7% in instant coffee), acetic acid (11.2%/8.8%) and the high MW acids (8%/9%) contribute to the total acidity. [Engelhardt U.H., Maier H.G.; Z Lebensm-Unters-Forsch 181 (1): 20-3 (1985)] **PEER REVIEWED**

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Manmade Sources (HSDB) -

Manufacturing source: beetsugar manufacturing; winery; vinegar manufacturing; textile mills; wood distillation plants. [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 143] **PEER REVIEWED**

Man made sources /of acetic acid have contributed/ 2.5 to 3.6 mg/l in domestic sewages. The average content of secondary sewage effluent is 0.130 mg/l. [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 144] **PEER REVIEWED**

Acetic acid ... /was/ present in 5 month-old compost of a town refuse. [DeVleeschauwer D, et al; BioCycle 22 (1): 44-6 (1981)] **PEER REVIEWED**

Acetic acid is released to the environment in waste emissions from the manufacture of various chemicals, explosives, lacquers, starch, sugars, wines and vinegar and from wood distillation plants and textile mills (1,2). Atmospheric emissions occur from combustion of biomass, plastics and refuse and in exhaust from gasoline and diesel engines (1,2,3). [(1) Abrams E.F. et al; Identification of Organic Compounds in Effluents from Industrial Sources. USEPA-560/3-75-002 p. 3 (1975); (2) Graedel T.E. et al; Atmospheric Chemical Compounds. Sources, Occurrence and Bioassay. Orlando, FL: Academic Press p. 345 (1986); (3) Kawamura K. et al; Environ Sci Technol 19: 1082-6 (1985)] **PEER REVIEWED**

Routes of Exposure (HSDB) -

Acetic acid can affect the body if it is inhaled or if it comes in contact with the eyes or skin. It can also affect the body if it is swallowed. [NIOSH OSHA. OCCUPAT HEALTH GUIDE CHEM HAZARDS. 1981 , p. 1] **PEER REVIEWED**

Acetic acid occurs ubiquitously and is a normal metabolite in animals; therefore, the general population is continually exposed to the compound. Primary routes of exposure to the general population are through consumption of foods and inhalation of air. Occupational exposure occurs through inhalation and dermal contact. (SRC) [CITATION] **PEER REVIEWED**

AIR INTAKE: Assume ambient atmospheric concns of 0.1-1.6 ug/cu m (1); 2-32 ug/day; WATER INTAKE: insufficient data; FOOD INTAKE: insufficient data(SRC). [(1) Kawamura K. et al; Environ Sci Technol 19: 1082-6 (1985)] **PEER REVIEWED**

NIOSH (NOHS Survey 1972-74) has statistically estimated that 1,400,824 workers are potentially exposed to acetic acid (1). NIOSH (preliminary NOES Survey 1981-1983) has statistically estimated that 340,218 workers are potentially exposed to acetic acid (2). [(1) NIOSH; National Occupational Hazard Survey (NOHS) (1974); (2) NIOSH; National Occupational Exposure Survey (NOES) (1983)] **PEER REVIEWED**

000568

Biodegradation (HSDB) -

Biological oxygen demand after 10 days at 20 deg C is: 82% biological oxidation in fresh water and 88% biological oxidation in sea water [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 144] **PEER REVIEWED**

Closed bottle test, 5-30 day 51-99% theoretical Biochemical Oxygen Demand BOD(1). Warburg respirometer, 30-day 60% theoretical BOD, acclimated sewage seed (2). Zahn-Wellens test, >90% degradation in 3 days using an activated sludge inocula (3). French Association for Standardization (AFNOR) T 90/103 test, 5-day 36% theoretical BOD, microbes from 3 polluted surface waters (4). Standard dilution BOD water, 5-day 57.7% theoretical BOD avg (5). Water-die away tests, 12.3%/hr in estuarine water, 1.0%/hr in Belgian coastal water, 0.06%/hr in open seawater (6). Standard dilution BOD water, 76-96% theoretical BOD in 5-20 days; Seawater dilution, 66-100% theoretical BOD in 5-20 days, sewage inocula (7). Batch aeration in sewage, 99.5% degradation in 24 hr (8). Warburg respirometer, 24-hr 40% theoretical BOD, activated sludge inocula (9). [(1) Fischer W.K. et al; Wasser-Und Abwasser-Forschung 7: 99-118 (1974); (2) Helfgott T.B. et al; An Index of Refractory Organics. USEPA-600/2-77-174 (1977); (3) Zahn R., Wellens H.; Z Wasser Abwasser Forsch 13: 1-7 (1980); (4) Dore M. et al; Trib Cebedeau 28: 3-11 (1975); (5) Heukelekian H., Rand M.C.; J Water Pollut Control Assoc 29: 1040-53 (1955); (6) Billen G. et al; Estuarine Coastal Marine Sci 11: 279-94 (1980); (7) Price KS et al; J Water Pollut Control Fed 46: 63-77 (1974); (8) Placak O.R., Ruchhoft C.C.; Sewage Works J 19: 423-40 (1947); (9) Malaney G.W., Gerhold R.M.; J Water Pollut Control Fed 41: R18-R33 (1963)] **PEER REVIEWED**

Warburg respirometer, 5-day 77% theoretical BOD, sewage inocula (1). Batch aeration, virtual loss of BOD in 6 hr, settled domestic sewage inocula (2). Standard dilution BOD water, 5-day 81.3% theoretical BOD, 5-day 77.6% theoretical BOD (3). Standard dilution BOD water, 5-day 63.2% theoretical BOD, sewage inocula (4). Electrolytic respirometer test, 10-day 87% theoretical BOD (5). Laboratory-scale anaerobic digester, microbial decay coefficient of 0.283/day (6). Modified Organization of Economic Cooperation Development (OECD) protocol, 75% degradation in 14 days using garden soil as inocula, >90% degradation in 14 days using sediment from the Rhine River as inocula (7). Biofilm column study, 95% removal under aerobic conditions, 99% removal under methanogenic conditions (8). [(1) Dias F.F., Alexander M.; Appl Microbiol 22: 1114-8 (1971); (2) Hatfield R.; Ind Eng Chem 49: 192-6 (1957); (3) Takemoto S. et al; Suishitsu Odaku Kenkyu 4: 80-90 (1981); (4) Saito T. et al; Fresenius Z Anal Chem 319: 433-4 (1984); (5) Urano K., Kato Z.; J Hazardous Mater 13: 147-59 (1986); (6) Lin C. et al; Water Res 20: 385-94 (1986); (7) Kool HJ; Chemosphere 13: 751-61 (1984); (8) Bouwer E.J., McCarty P.L.; Ground Water 22: 433-40 (1984); (9) Strayer R.F., Tiedje J.M.; Appl Environ Microbiol 36: 330-40 (1978)] **PEER REVIEWED**

Abiotic Degradation (HSDB) -

The experimentally determined rate constant for the vapor-phase reaction of acetic acid with photochemically produced hydroxyl radicals has been reported to be 0.6×10^{-12} cu cm/molecule-sec at 25 deg C (1); the atmospheric half-life for this reaction can be estimated to be 26.7 days, assuming an average atmospheric hydroxyl radicals concn of 5×10^5 molecules/cu cm (1, SRC). The rate constant for the reaction of acetic acid with hydroxyl radicals in aqueous solution is approximately $0.48-0.85 \times 10^8$ L/mol-sec (2,3); if the hydroxyl radicals concn of sunlit natural water is assumed to be 1×10^{-17} moles/L (4), the half-life would be approximately 26-46 years (SRC). Carboxylic acids are generally resistant to aqueous environmental hydrolysis (5). [(1) Atkinson R.A.; Chem Rev 85: 60-201 (1985); (2) Anbar M., Neta P.; Int J Appl Radiation and Isotopes 18: 493-523 (1967); (3) Dorfman L.M., Adams G.E.; Reactivity of Hydroxyl Radical in Aqueous Solution, NSRD-NBS-46 Washington, DC: Natl Bureau of Standards (1973); (4) Mill T. et al; Science 207: 886-7 (1980); (5) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods NY: McGraw-Hill p. 7-4 (1982)] **PEER REVIEWED**

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Other Biological / Environmental Data (HSDB) -

Acetic acid shows no potential for biological accumulation or food chain contamination. [Environment Canada; Tech Info for Problem Spills: Acetic Acid (Draft) p.1 (1981)] **PEER REVIEWED**

Based on a log Kow of -0.17 (1), the BCF for acetic acid can be estimated to be <1 (2, SRC). This indicates that bioconcentration is not significant (SRC). [(1) Hansch C., Leo A.J.; Medchem Project Issue No. 26 Claremont CA: Pomona College (1985); (2) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods NY: McGraw-Hill p. 5-4 (1982)] **PEER REVIEWED**

In 24 hr aqueous adsorption studies using montmorillonite and kaolinite clay adsorbents, 2.4-30.4% of added acetic acid was observed to be in the adsorbed phase (1). In adsorption studies using the adsorbent hydroxyapatite (a mineral which occurs in the environment as a result of the diagenesis of skeletal apatite), only 5% of added acetic acid (in aqueous solution) became adsorbed to the hydroxyapatite (2). Acetic acid has been noted to leach from biological disposal areas (3). [(1) Hemphill L., Swanson W.S.; Proc of the 18th Industrial Waste Conf, Eng Bull Purdue Univ, Lafayette IN 18: 204-17 (1964); (2) Gordon A.S., Millero F.J.; Microb Ecol 11: 289-98 (1985); (3) Abrams E.F. et al; Identification of Organic Compounds in Effluents from Industrial Sources. USEPA-560/3-75-002 p. 3 (1975)] **PEER REVIEWED**

Acetic acid has a pKa of 4.75 at 25 deg C (1); therefore, it will exist predominantly in the anionic form in the environment. The adsorption characteristics of an anionic species may be different from the neutral species, and cannot be predicted adequately without experimental data (SRC). [(1) Weast R.C.; CRC Handbook of Chemistry and Physics 66th ed, Boca Raton, FL: CR Press p. D-161 (1985)] **PEER REVIEWED**

The Henry's Law constant for acetic acid has been experimentally measured to range from 1×10^{-7} atm-cu m/mole at pH 4 to 1×10^{-9} atm-cu m/mole at pH 7 (1). These values of Henry's Law constant indicate that acetic acid will not volatilize significantly from water (2). [(1) Gaffney J.S. et al; Environ Sci Technol 21: 519-24 (1987) (2) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods NY: McGraw-Hill p. 15-15 (1982)] **PEER REVIEWED**

The average content of secondary sewage effluent is 0.130 mg/l. [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 144] **PEER REVIEWED**

Acetic acid was qualitatively detected in wastewater effluents from publicly owned treatment works (POTW) in Decatur and Bensenville, IL (1). Acetic acid concns of 125 ppm were identified in wastewaters from a coal gasification facility in N Dakota (2). Wastewater from a shale oil process in Australia contained 140 ppm acetic acid (3). Acetic acid was detected in leachate from a sanitary landfill in Barcelona, Spain (4). Acetic acid has reportedly been detected in wastewater effluents from chemical, resin, and paper manufacturing plants, from various landfill leachates, and from sewage treatment facilities (5). [(1) Ellis D.D. et al; Arch Environ Contam Toxicol 11: 373-82 (1982); (2) Giabbai M.F. et al; Intern J Environ Anal Chem 20: 113-29 (1985); (3) Dobison K.R. et al; Water Res 19: 849-56 (1985); (4) Albaiges J. et al; Water Res 20: 1153-9 (1986); (5) Shackelford W.M., Keith L.M.; Frequency of Organic Compounds Identified in Water. USEPA-600/4-76-062 p. 47-8 (1976)] **PEER REVIEWED**

000570

**PERACETIC ACID
ENVIRONMENTAL FATE DATA**

PERACETIC ACID

CAS RN: 79-21-0

Environmental and Natural Sources (HSDB) -

Peracetic acid is formed naturally in the atmosphere through a series of photochemical reactions involving formaldehyde and photo-oxidant radicals. Due to its high water solubility, it can dissolve in clouds and rainwater. It has been identified as a constituent of acid rain. If released to the atmosphere or formed in the atmosphere, peracetic acid will most likely be removed physically by wet deposition processes. Degradation in the atmosphere is slow (estimated half-life for hydroxyl radical reaction is 445 days). If released to soil or water, peracetic acid is expected to react with organic materials, metal ions and complexes since it is chemically reactive. Occupational exposure to peracetic acid can occur through dermal contact and inhalation of vapor. (SRC) [CITATION] **PEER REVIEWED**

Peracetic acid can be formed naturally in the atmosphere through a series of photochemical reactions (1); for example, photo-oxidation of formaldehyde leads directly to the formation of hydroperoxyl radicals which react with peroxyacetyl radicals to form peracetic acid (1); the presence of anthropogenic nitric oxide decreases the formation rate of peracetic acid since it reacts preferentially with the species needed to form peracetic acid(1); therefore, atmospheric formation of peracetic acid will be greater at remote regions removed from sources of human pollution(1); the solubility of peracetic acid enables it to become a constituent of acid rain (1). [(1) Gaffney J.S. et al; Environ Sci Technol 21: 519-24 (1987)] **PEER REVIEWED**

Manmade Sources (HSDB) -

Peracetic acid's uses in textile and paper bleaching and in the production of epoxides and epoxy resins(1-2) could release the compound in production to the environment through wastewater effluents (SRC). [(1) Sheppard C.S., Mageli O.L.; Peroxides & Peroxy Compounds Organic In: Kirk-Othmer Encycl Chem Technol 3rd ed. NY: John Wiley & Sons 17: 60-2 (1982); (2) Hawley G.G.; The Condensed Chemical Dictionary 10th ed. NY: Van Nostrand Reinhold Co p. 786 (1981)] **PEER REVIEWED**

Environmental Fate (HSDB) -

TERRESTRIAL FATE: Peracetic acid is a chemically reactive compound (1) that can be expected to react with organic materials, metal ions and complexes that exist in the soil environment. Insufficient data are available to predict the relative importance of biodegradation in soil. An estimated Koc value of 7.5 suggests that non-ionized peracetic acid will leach readily in soil (2, SRC); however, concurrent reactivity with soil materials will probably negate the potential importance of leaching (SRC). [(1) Sheppard C.S., Mageli O.L.; Kirk-Othmer Encycl Chem Technol 3rd ed. NY: John Wiley & Sons 17: 60-1 (1982); (2) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc p. 4-9 (1990)] **PEER REVIEWED**

AQUATIC FATE: Peracetic acid is a chemically reactive compound (1) that can be expected to react with organic materials, metal ions and complexes that exist in the aquatic environment. Insufficient data are available to predict the relative importance of biodegradation in water. Aquatic volatilization, adsorption to sediment, and bioconcentration are not expected to be important fate processes (SRC). [(1) Sheppard C.S., Mageli O.L.; Kirk-Othmer Encycl Chem Technol 3rd ed. NY: John Wiley & Sons 17: 60-1 (1982)] **PEER REVIEWED**

000571

ATMOSPHERIC FATE: Based upon a vapor pressure of 14.5 mm Hg at 25 deg C (1), peracetic acid is expected to exist almost entirely in the vapor-phase in the ambient atmosphere (2, SRC). It will degrade very slowly in an average ambient atmosphere by reaction with photochemically produced hydroxyl radicals (estimated half-life of 445 days) (3, SRC). Physical removal from air via wet deposition is likely to occur since peracetic acid is freely soluble in water (4, SRC); acidic precipitation can contain peracetic acid at nanomolar to low micromolar concentrations (5). [(1) Daubert T.E., Danner R.P.; Physical and Thermodynamic Properties of Pure Chemicals: Data Compilation, NY: Hemisphere Pub Corp (1989); (2) Eisenreich S.J. et al; Environ Sci Technol 15: 30-8 (1981); (3) Atkinson R.; J Inter Chem Kinet 19: 799-828 (1987); (4) Merck; The Merck Index 10th ed. Rahway, NJ: Merck & Co p. 1028 (1983); (5) Gaffney J.S. et al; Environ Sci Technol 21: 519-24 (1987)] **PEER REVIEWED**

The rate constant for the vapor-phase reaction of peracetic acid with photochemically produced hydroxyl radicals has been estimated to be 3.60×10^{-14} cu cm/molecule-sec at 25 deg C which corresponds to an atmospheric half-life of about 445 days at an atmospheric concn of 5×10^5 hydroxyl radicals per cu cm (1, SRC). Organic peroxyacids are not noted for their stability (2); water-soluble peroxyacids (such as peracetic acid) hydrolyze slowly to the parent compound and hydrogen peroxide (2); peroxyacids are decomposed by a variety of metals, metal ions, and complexes (2); peracetic acid is a strong oxidizing agent (2). [(1) Atkinson R.; J Inter Chem Kinet 19: 799-828 (1987); (2) Sheppard C.S., Mageli O.L.; Kirk-Othmer Encycl Chem Technol 3rd ed. NY: John Wiley & Sons 17: 60-1 (1982)] **PEER REVIEWED**

Other Biological / Environmental Data (HSDB) -

Based upon an estimated Log Kow of -0.924(1), the BCF for peracetic acid can be estimated to be 0.12(SRC) from a recommended regression-derived equation (2). This indicates that bioconcentration in aquatic organisms is not important and in any case, peracetic acid would rapidly react with organic material (SRC). [(1) USEPA; Graphical Exposure Modeling System (GEMS). CLOGP (1987); (2) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc p. 5-4 (1990)] **PEER REVIEWED**

Based upon a pKa of 8.20 at 25 deg C(1), peracetic acid can exist in both the ionized and non-ionized forms in environmental waters; the percentage of ionization depends upon pH with a 50% ionization occurring at pH 8.20; the sorption of ionized peracetic acid in soil cannot be predicted without experimental data (SRC). Based upon an estimated log Kow of -0.924 (2), the Koc for non-ionized peracetic acid can be estimated to be 7.5 (SRC) from a regression-derived equation (3); this estimated Koc suggests that peracetic acid is very highly mobile in soil(4); however, concurrent reactivity with soil materials will probably negate the potential importance of leaching (SRC). [(1) Dean J.A.; Lange's Handbook of Chemistry 13th ed. NY: McGraw-Hill Book Co p. 5-53 (1985); (2) USEPA; Graphical Exposure Modeling System (GEMS). CLOGP (1987); (3) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc p. 4-9 (1990); (4) Swann R.L. et al; Res Rev 85: 23 (1983)] **PEER REVIEWED**

Peracetic acid has an experimentally measured Henry's Law constant of 2.08×10^{-6} atm cu m/mole at 25 deg C (1); a Henry's Law constant of this value indicates that volatilization from environmental waters is slow (2). Based on the Henry's Law constant, the volatilization half-life from a model river (1 m deep flowing 1 m/sec with a wind velocity of 3 m/sec) can be estimated to be about 15.5 days (2, SRC). Volatilization half-life from an model environmental pond (2 meters deep) can be estimated to be about 167 days (3, SRC). Peracetic acid has a relatively high vapor pressure of 14.5 mm Hg at 25 deg C (4) which suggests that some evaporation from dry surfaces can occur (SRC). [(1) Gaffney J.S. et al; Environ Sci Technol 21: 519-24 (1987); (2) Lyman W.J. et al; Handbook of Chemical Property Estimation Methods Washington, DC: Amer Chem Soc pp. 15-15 to 15-29 (1990); (3) USEPA; EXAMS II Computer Simulation (1987); (4) Daubert T.E., Danner R.P.; Physical and Thermodynamic Properties of Pure Chemicals: Data Compilation, NY: Hemisphere Pub Corp (1989)] **PEER REVIEWED**

000572

Routes of Exposure (HSDB) -

Occupational exposure to peracetic acid can occur through dermal contact and inhalation of vapor (1, SRC); personal protective equipment, including eye protection equipment, should be worn by persons handling the material (1). [(1) Parmeggiani L.; Encycl Occup Health & Safety 3rd ed Geneva, Switzerland: International Labour Office p. 44-5 (1983)] **PEER REVIEWED**

NIOSH (NOES Survey 1981- 1983) has statistically estimated that 1,729 workers are potentially exposed to peracetic acid in the USA (1). NIOSH (NOHS Survey 1972-1974) has statistically estimated that 1,683 workers are potentially exposed to peracetic acid in the USA (2). [(1) NIOSH; National Occupational Exposure Survey (NOES) (1983); (2) NIOSH; National Occupational Hazard Survey (NOHS) (1974)] **PEER REVIEWED**

000573

**OCTANOIC ACID
ENVIRONMENTAL FATE DATA**

OCTANOIC ACID

CAS RN: 124-07-2

Environmental and Natural Sources (HSDB) -

Reported as frequently occurring naturally in essential oils of: Cupressus torulosa, Cryptomer A Japonica, Andropogon iwarancusa, Cymbopogon javanensis, Camphor, Nutmeg, Lemon Grass, Lime, Tobacco (flowers), Artemissa herba-alba, Camomile, Hops...Apple aroma, Coconut oil...& wine... Lemon oil. [FENAROLI HDBK FLAVOR INGRED 2ND ED VOL2 1975 , p. 442] **PEER REVIEWED**

Octanoic acid/ 8% in coconut oil [KIRK-OTHMER ENCYC CHEM TECH 3RD ED 1978-PRESENT V21 p.164] **QC REVIEWED**

Synopsis -

Because it is a naturally occurring fatty acid octanoic acid will be readily utilized by animals, plants, and microbial organisms as a source of carbon and energy.

000574

SODIUM-1-OCTANE SULFONIC ACID: Carboxylic acid analog data provided

NONANOIC ACID [carboxylic acid analog of 1-octanesulfonic acid]

CAS RN: 112-05-0

...AS AN ESTER IN OIL OF PELARGONIUM: REDTENBACHER, ANN 59: 41, 52, 54 (1846). [MERCK INDEX 9TH ED 1976, p. 916] **PEER REVIEWED**

...IN SEVERAL ESSENTIAL OILS, EITHER FREE OR ESTERIFIED: ROSE, GERANIUM, ORRIS, LITSEA CUBEBA, ARTEMISIA ARBORESCENS L, HOPS, CHAMAECYPARIS PISIFERA ENDL, EREMOCITRUS GLAUCA L, FRENCH LAVENDER, AND IN OAK MUSK. [FENAROLI HDBK FLAVOR INGRED 2ND ED VOL2 1975, p. 433] **PEER REVIEWED**

NO HAZARD IS LIKELY IN INDUSTRIAL USE. [ENCYC OCCUPAT HEALTH & SAFETY 1971, p. 29] **PEER REVIEWED**

CAPRIC ACID [1 carbon longer carboxylic acid analog of 1-octane sulfonic acid]

CAS RN: 334-48-5

CAPRIC ACID, ISOLATED FROM AMERICAN ELM (ULMUS AMERICANA) SEEDS, WAS IDENTIFIED AS THE ANTIFUNGAL AGENT ACTIVE AGAINST THE DUTCH ELM DISEASE FUNGUS (CERATOCYSTIS ULMI) & SEVERAL OTHER FUNGI. [DOSKOTCH RW ET AL; PHYTOPATHOLOGY 65(5) 634-5 (1975)] **PEER REVIEWED**

OCTANOIC ACID, DECANOIC ACID, DODECANOIC ACID, TETRADECANOIC ACID, & HEXADECANOIC ACID (11.0-18.7% OF THE TOTAL ACIDS) WERE ISOLATED FROM THE NATURAL SEX PHEROMONES OF MALE MEDITERRANEAN FRUIT FLY (CERATITIS CAPITATA). [OHINATA K ET AL; J ENVIRON SCI HEALTH PART A A12(3) 67-78 (1977)] **PEER REVIEWED**

NATURAL FOOD OCCURANCES: ANISE, BUTTER ACIDS, OIL OF LIME, OIL OF LEMON. [CHEMICALS USED IN FOOD PROCESSING; NAS/NRC PUBL 1274 WASHINGTON DC (1965)] **PEER REVIEWED**

CAPRIC ACID (0.9%) WAS FOUND IN THE SEED OIL OF GARCINIA MANGOSTANA. [DAULATABAD CD, ANKALGI R.F.; J OIL TECHNOL ASSOC INDIA 10(2) 36-9 (1978)] **PEER REVIEWED**

Occurs as a glyceride in natural oils [HAWLEY. CONDENSED CHEM DICTNRY 10TH ED 1981 p.190] **QC REVIEWED**

Synopsis -

Since the fatty alkyl chain is oxidizable by living organisms it is expected that sodium 1-octane sulfonate will be used as an energy source as well as for its carbon and sulfur content by soil and water microflora.

000575

**HEDP
ENVIRONMENTAL FATE DATA**

1-HYDROXY-1,1-DIPHOSPHONOETHANE

CAS RN: 2809-21-4

Citations from the Chemical Abstracts Data Base -

- TI Properties of hydroxyethane diphosphonate affecting its environmental fate: degradability, sludge adsorption, mobility in soils, and bioconcentration
- AU Steber, J.; Wierich, P.
- CS Dep. Ecol., Henkel K.G.a.A., Duesseldorf, D-4000/1, Fed. Rep. Ger.
- SO Chemosphere (1986), 15(7), 929-45
- AB No indication of aerobic or anaerobic biodegradability of hydroxyethane diphosphonate (HEDP) [***2809-21-4***] was found. Nevertheless, the ***abiotic*** degradability of HEDP, particularly in natural waters under sunlight exposure, yielding acetate and inorg. phosphate excludes its environmental persistence. From adsorption and leaching studies a considerable HEDP elimination by sludge adsorption in sewage treatment plants and a characterization as moderately to little mobile in soils can be deduced. The results of a dynamic bioaccumulation test with fish show that HEDP has a very low bioconcn. potential.
- TI Distribution and elimination of HEDP in aquatic test systems
- AU Fischer, Klaus
- SO Water Res. (1993), 27(3), 485-93
- AB Basic reactions, including adsorption/desorption and photodegrdn., which influence the behavior and fate of chelating agents in sewage treatment processes and in aquatic ecosystems, were evaluated for HEDP. Freundlich consts. for the HEDP-sorption onto clay minerals, river sediments, and sewage sludges are mostly in the range between 500 and 3000. A remarkable desorption occurs only in strong acidic or higher concd. salt solns. Photodegrdn. is initialed in the presence of heavy metal ions and/or by maintaining acid pH conditions. The possibility of HEDP photodegrdn. in river water could be verified with a special equipment for the simulation of solar radiation. This investigation supports the assumption that discharged HEDP will be able to accumulate and persist in the aquatic ***environment*** if adsorption restricts the efficiency of the phosphonate photolysis.
- TI Distribution and photodegradation of chelating agents in ***environment*** -related test systems
- AU Fischer, Klaus
- SO GSF-Ber. (1992), 4/92, Ecol. Approaches Environ. Chem., 64-72
- AB The adsorption of HEDP and NTA on clay minerals, sediments, soils, and wastewater treatment sludges, desorption, and the effects of pH and Cu and Fe on the photodegrdn. of HEDP and NTA are described.

000576

TI Sorption of chelating agents (HEDP and NTA) onto mineral phases and sediments in aquatic model systems. Part I: sorption onto clay minerals

AU Fischer, Klaus

SO Chemosphere (1991), 22(1-2), 15-27

AB The fate of org. chelating agents in the aquatic ***environment*** may be detd. by reactions, which regulate the distribution of chems. between the solid and liq. phase. Esp. adsorption/desorption processes are important for the adjustment of the distribution equil. To assess the influence of such processes on the environmental fate of the phosphate substituting chelates 1-hydroxyethane-1,1-diphosphonic acid (HEDP) and nitrilotriacetic acid (NTA), adsorption studies were carried out in aquatic model systems, contg. different adsorbents like clay minerals, sediments and sewage sludges. -In the case of NTA, sorption strengths were kaolinite < engobe clay < bentonite.

000577

ENVIRONMENTAL TOXICITY DATA RETRIEVED FROM
THE HAZARDOUS SUBSTANCES DATA BASE
SYSTEM OF THE NATIONAL LIBRARY OF MEDICINE

NAME - ACETIC ACID/RN - 64-19-7

ETXV - LC50 Fathead minnows > 315 mg/l/1 hr; 122 mg/l/24 hr; 92 mg/l/48 hr; 88 mg/l/72 hr; 88 mg/l/96 hr (static bioassay in reconstituted water at 18-22 deg C) [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145]
PEER REVIEWED

ETXV - LC50 Fathead minnows 175 mg/l/1 hr; 106 mg/l/24 hr; 106 mg/l/48 hr; 79 mg/l/72 hr; 79 mg/l/96 hr (static bioassay in reconstituted water at 18-22 deg C, pH < 5.9) [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

ETXV - TLm Culex (larvae) 1,500 mg/l/24-48 hr /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 146]
PEER REVIEWED

ETXV - LD0 Creek chub 100 mg/l/24 hr; Detroit river /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145]
PEER REVIEWED

ETXV - LD100 Creek chub 200 mg/l/24 hr; Detroit river /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145]
PEER REVIEWED

ETXV - TLm Daphnia magna (Arthropoda) 47 mg/l/24 hr /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145]
PEER REVIEWED

ETXV - TLm Bluegill 75 mg/l/96 hr /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

ETXV - TLm Lepomis macrochirus 100-1000 mg/l/24 hr /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145]
PEER REVIEWED

ETXV - TLm Mosquito fish 251 mg/l/24-96 hr /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145]
PEER REVIEWED

000578

ETXV - Goldfish: lethal dose at 423 mg/l 20 hr, period of survival at pH 6.8 is 48 hr to 4 days at 100 ppm; period of survival at pH 7.3 is 4 days at 10 ppm [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

ETXV - TLm Sunfish 75 mg/l/96 hr 18-20 deg C, soft water [Environment Canada; Tech Info for Problem Spills: Acetic Acid (Draft) p.76 (1981)] **PEER REVIEWED**

ETXV - LC50 Shrimp 100-300 mg/l/48 hr aerated water [Environment Canada; Tech Info for Problem Spills: Acetic Acid (Draft)-p.76 (1981)] **PEER REVIEWED**

ETXV - TLm Brine shrimp 22 mg/l/48 hr /Conditions of bioassay not specified/ [Environment Canada; Tech Info for Problem Spills: Acetic Acid (Draft) p.76 (1981)] **PEER REVIEWED**

ETXV - Microcystis aeruginosa (algae) 90 mg/l toxic effect: cell multiplication inhibition [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

ETXV - Scenedesmus quadricauda (green algae) 4000 mg/l toxic effect: cell multiplication inhibition [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

TXV - Entosiphon sulcatum (protozoa) 78 mg/l toxic effect: cell multiplication inhibition [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

ETXV - Uronema parduezi Chatton-Lwoff (protozoa) 1350 mg/l toxic effect: cell multiplication inhibition [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

ETXV - TLm Brine shrimp (Arthropoda) 42-32 mg/l/24-48 hr /Conditions of bioassay not specified/ [VERSCHUEREN.HDBK ENVIRON DATA ORG CHEM 1983 , p. 145] **PEER REVIEWED**

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