



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): ORTHO-ARSENIC ACID SOLUTION

SYNONYMS: Arsenic Acid Solution
PRODUCT USE: Industrial Technical Grade

SUPPLIER/MANUFACTURER'S NAME: Mineral Research and Development
ADDRESS: 200 East Woodlawn Road
One Woodlawn Green – Suite 250
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MSDS PREPARATION DATE: January 30, 2003

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	%wt	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		OTHER	
			TLV mg/m ³	STEL mg/m ³	PEL mg/m ³	STEL mg/m ³		IDLH mg/m ³
Ortho-Arsenic Acid Unless otherwise specified, the following exposure limits are for inorganic Arsenic compounds.	7778-39-4	65 - 80	For Arsenic Acid: 0.01 A1 (Confirmed Human Carcinogen)	NE	0.01	NE	5	NIOSH REL: 0.002 (15 minute Ceiling) Carcinogen:: EPA-A, IARC-1; MAK-A1; NIOSH-X; NTP-1; OSHA-X
Water and other components. Each of the other components are present in less than 1 percent concentration (0.1% concentration for potential carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens).		Balance	None of the other components contribute significant additional hazards at the concentrations present in this product. All pertinent hazard information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards and Canadian Workplace Hazardous Materials Identification System Standards (CPR 4).					

NE = Not Established C = Ceiling Limit See Section 16 for Definitions of Terms Used

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This light-green to yellow, odorless liquid is highly toxic and a severe irritant. This solution can severely irritate, redden, and potentially burn skin, eyes, and other contaminated tissue. Arsenic Acid is a confirmed human carcinogen and must be considered a potential human reproductive toxin. This product is not flammable or reactive; however, if exposed to high temperatures, toxic decomposition products (e.g., arsine, arsenic oxides) will be generated. Persons who respond to releases of this product must protect themselves from inhalation of vapors or mists generated by the product, especially in areas which are downwind of the spill. Extreme caution must be used when responding to spills. Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are inhalation, and contact with skin and eyes. The symptoms of over-exposure to this product are as follows:

INHALATION: If vapors, mists or sprays of this solution are inhaled, this product may cause pulmonary irritation. Damage to the respiratory system tissue may also occur, especially after prolonged or repeated exposures. Symptoms may include coughing, breathing difficulty, a sore throat, laryngitis, headache, nausea, and vomiting. A "hole" in the nasal septum can develop as a result of repeated inhalation exposures. Pulmonary edema, chemical pneumonitis, and other adverse health consequences may occur after severe overexposures. Severe inhalation exposures can be fatal.

It is important to note that high, repeated overexposures to this product can cause severe health effects. Chronic overexposure to Arsenic Acid can cause nerve damage, with "pins and needles" numbness and weakness of the arms and legs. There have also been reports of adverse effects on the liver, kidneys, cardiovascular system, and blood systems associated with chronic overexposure to arsenic compounds. Subsequently, there is a potential for serious health consequences (e.g., cirrhosis, kidney failure, gangrene, anemia) from chronic overexposure to this product. Arsenic Acid is a confirmed human carcinogen.

CONTACT WITH SKIN or EYES: Contact with the eyes will cause moderate to severe irritation, pain, reddening, and watering. Blindness may occur, especially after prolonged contact. Skin contact causes reddening, discomfort, and moderate to severe irritation. Skin contact may cause chemical burns (especially after prolonged contact); blistering of and damage to the skin. Skin contact with Arsenic Acid can result in darkening or loss of pigment in affected areas. Overexposure to this substance may also result in white lines in nails.




SKIN ABSORPTION: Skin absorption is not a significant route of exposure for any component of this product.

INGESTION: Ingestion is not anticipated to be a likely route of exposure to this product. If ingestion does occur, irritation and burns of the mouth, throat, esophagus, and other tissues of the digestive system will occur immediately upon contact. Arsenic Acid, a component of this product, is toxic by ingestion. Symptoms of such over-exposure can include nausea, vomiting, diarrhea. Chronic swallowing of this product (as may occur in situations involving poor hygiene practices) can result in symptoms of exposure described for "Inhalation". Ingestion of this product may be fatal.

INJECTION: Accidental injection of this product, via laceration or puncture by a contaminated object, may cause pain and irritation in addition to the wound. Symptoms described in "Inhalation" or Ingestion" may also occur.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. In the event of exposure, the following symptoms may be observed:

ACUTE: This solution is highly toxic and may be moderately to severely irritating and damaging to eyes, skin, mucous membranes, and any other exposed tissue. Skin contact may cause chemical burns, blisters, and scars; eye contact may cause blindness. If inhaled, moderate to severe irritation of the respiratory system may occur, with coughing, and breathing difficulty. Overexposures by inhalation and ingestion may be fatal.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	3
FLAMMABILITY		(RED)	0
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			X
EYES	RESPIRATORY	HANDS	BODY
	SEE SECTION 8		
For routine wood-treatment procedures.			

See Section 16 for Definition of Ratings

3. HAZARD IDENTIFICATION (Continued)

CHRONIC: Arsenic Acid is a confirmed human carcinogen and must be considered a potential human reproductive toxin. Persistent irritation and dermatitis (reddening and inflammation of the skin) may result from chronic skin contact. Chronic inhalation exposure may result in nervous system effects. Chronic exposure may also result in liver, kidney, and blood effects. See Section 11 (Toxicological Information) for additional data.

TARGET ORGANS: Acute: Skin, eyes, respiratory system, reproductive system. Chronic: nervous system, cardiovascular system, blood, kidneys.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

SKIN EXPOSURE: If the product contaminates the skin, immediately decontaminate the affected area with running water. The minimum recommended flushing time is at least 15 minutes. If necessary, remove exposed or contaminated clothing, taking care not to contaminate eyes.

EYE EXPOSURE: If this product enters the eyes, open the contaminated individual's eyes while under gentle running water. Use sufficient force to open eyelids. Have the contaminated individual "roll" eyes. Minimum flushing is for 15 minutes.

INHALATION If vapors, mists or sprays of this product are inhaled, remove the contaminated individual to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If this product is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.

Contaminated individuals must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of the label and MSDS to physician or health professional with victim.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.

AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): Not applicable.

Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: This product is not flammable. Use fire extinguishing material appropriate for the surrounding area.

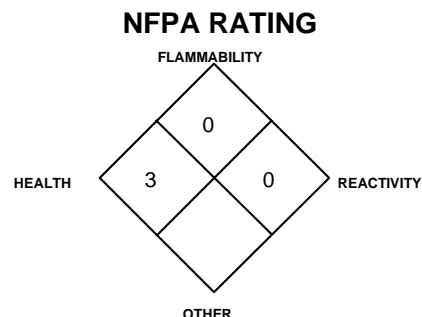
Water Spray: YES **Carbon Dioxide:** YES **Foam:** YES
Dry Chemical: YES **Halon:** YES **Other:** Any "ABC" Class.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This product is toxic and severely irritating and presents a severe contact-hazard to firefighters. When involved in a fire and exposed to extremely high temperatures, the components of this product will decompose to produce extremely irritating vapors and toxic gases (e.g., arsenic compounds, arsine).

Explosion Sensitivity to Mechanical Impact: Not applicable.

Explosion Sensitivity to Static Discharge: Not applicable.

SPECIAL FIRE-FIGHTING PROCEDURES: Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas. If necessary, neutralize any contaminated fire-response equipment with water before returning such equipment to service.



**See Section 16 for
Definition of Ratings**

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: In case of a spill, clear the affected area, protect people. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people.

6. ACCIDENTAL RELEASE MEASURES (Continued)

In terms of small, incidental releases (e.g., 1 gallon from a leaking container), the minimum personal protective equipment should be as follows: gloves, goggles, face shield, and appropriate body protection (e.g., boots, Tyvek suit). Respiratory protection (e.g., air-purifying respirator with a high efficiency particulate filter) must be worn if splashes or sprays will be generated. For large, non- incidental releases (e.g., 55-gallon drum), Minimum Personal Protective should be **Level B: triple-gloves (rubber gloves and nitrile gloves, over latex gloves), chemically resistant suit and boots, hard-hat, and Self Contained Breathing Apparatus**.

Absorb spilled liquid with polypads or other suitable absorbent materials. If necessary, dike the spill to prevent releases from contaminating environmentally sensitive areas. Rinse area with water. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Dispose residue in accordance with U.S. Federal, State, or local procedures and appropriate Canadian standards (see Section 13, Disposal Considerations).

PART III

How can I prevent hazardous situations from occurring?

7. HANDLING and STORAGE

WORK AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing vapors or mists generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately. Appropriate air monitoring programs, procedures, and record retentions and submissions must be conducted to evaluate the presence of Arsenic in the workplace. Applications of this product are toxic to fish and wildlife (see Section 12, Ecological Information). For terrestrial uses; do not apply this product directly to water, or to areas where surface water is present or to terrestrial areas below the mean high water mark.

STORAGE AND HANDLING PRACTICES -- NON-BULK CONTAINERS: All employees who handle this material should be trained to handle it safely. Open containers and drums slowly, on a stable surface. Open drum bunks carefully, to relieve any pressure build-up which may have developed during storage. All containers of this product must be properly labeled. Empty containers may contain residual amounts of this product; therefore, empty containers should be handled with care. Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Store away from incompatible materials (see Section 10, Stability and Reactivity). Material should be stored in secondary containers or in a diked area, as appropriate. Use corrosion-resistant structural materials, lighting, and ventilation systems in the storage area. Floors should be sealed to prevent absorption of this material. Keep container tightly closed when not in use. Inspect all incoming containers before storage to ensure that containers are properly labeled and are not damaged.

INTERMEDIATE BULK CONTAINERS AND PROCESS EQUIPMENT: Ensure material in bulk containers and process lines is properly labeled. Close all valves tightly when product is not being used. Determine that lines are not contaminated with incompatible materials before use in operations involving this product. Secondary containment (dikes and berms) should be used. Periodic inspection and maintenance of bulk containers and process equipment must be conducted.

TANK CAR SHIPMENTS: Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Exposure Controls - Personal Protection). All loading and unloading equipment must be inspected prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level and wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tank (for unloading) must be verified to be correct for receiving this product and be properly prepared prior to starting the transfer operations. Hoses must be verified to be clean and free of incompatible chemicals prior to connection to the tank car or vessel. Valves and hoses must be verified to be in the correct positions before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operation. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely, if necessary. Collect all rinsates and dispose of according to applicable U.S. Federal, State, or local procedures and appropriate Canadian standards (see Section 13, Disposal Considerations).

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to prevent inhalation of sprays or mists. All operations should be directed at minimizing the generation of aerosols, sprays, or mists. Use corrosion-resistant ventilation and other engineering controls. Eyewash stations/safety showers should be near use where and storage areas.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed in Section 2 (Composition and Information on Ingredients) if applicable. Individuals working in the work area of an arsenical wood treatment plant must wear properly fitting, well-maintained high efficiency respirators, if the level of inorganic arsenic exceeds 10 micrograms per cubic meter of air averaged over an eight-hour work period. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the appropriate standards of Canada and its Provinces. Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown. The following NIOSH guidelines are for Inorganic Arsenic Compounds, provided for additional information:

AT CONCENTRATIONS ABOVE THE NIOSH REL, OR WHERE THERE IS NO REL, AT ANY DETECTABLE CONCENTRATION: Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.

ESCAPE: Full-facepiece respirator with high-efficiency particulate filter(s); or escape-type SCBA.

NOTE: NIOSH has classified this material as a potential carcinogen, according to specific NIOSH criteria. This classification is reflected in these recommendations for respiratory protection, which specify that only the most reliable and protective respirators be worn.

EYE PROTECTION: Splash goggles or safety glasses. Wear face shield for operations involving more than 1 gallon of this solution in which splashes or sprays can be generated.

HAND PROTECTION: Wear Neoprene gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task (i.e. cover-alls, or rubber apron).

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): Not available.

SPECIFIC GRAVITY (water = 1): 1.73 - 1.884

SOLUBILITY IN WATER: Soluble.

VAPOR PRESSURE, mm Hg @ 20°C (68°F): Not available.

ODOR THRESHOLD: Not applicable.

LOG of OIL/WATER DISTRIBUTION (PARTITION COEFFICIENT): Not available.

APPEARANCE AND COLOR: This is a light-green to yellow, odorless liquid.

HOW TO DETECT THIS SUBSTANCE (warning properties): The color may act as a distinguishing characteristic of this product.

EVAPORATION RATE (n-BuAc = 1): Not determined.

MELTING\FREEZING POINT: Not determined.

BOILING POINT: > 100°C (> 212°F)

pH: < 1

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: Arsenic compounds, arsine.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids, strong bases, strong reducing reagents, halogens, metals (e.g., aluminum, copper, iron, brass, and zinc). This product will also be incompatible with water-reactive materials.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposure to extreme temperatures and contact with incompatible chemicals.

PART IV

Is there any other useful information about this material?

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: Additional toxicology data for components greater than 1 percent in concentration are provided below.

ARSENIC ACID:

Cytogenetic Analysis-Human: leukocyte 7200 nmol/L

Cytogenetic Analysis-Human: fibroblast 100 ppb

TDLo (Intraperitoneal-Rat) = 30 mg/kg (9D preg):Teratogenic effects

LD₅₀ (Oral-Rat) = 48 mg/kg

ARSENIC ACID (continued):

LDLo (Oral-Dog, adult) = 10 mg/kg

LDLo (Oral-Rabbit, adult) = 5 mg/kg

LDLo (Oral-Pigeon LDLo) = 100 mg/kg

LDLo (Oral-Chicken, adult) = 125 mg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: This product's ingredients are found on the following lists:

ARSENIC ACID:

EPA-A; Human Carcinogen
IARC-1; Carcinogenic to Humans
MAK-A1; Capable of Inducing Malignant Tumors
NIOSH-X; Carcinogen
NTP-1; Known to be a Carcinogen
OSHA-X; Carcinogen

IRRITANCY OF PRODUCT: This product is moderately to severely irritating to contaminated tissues.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer after prolonged or repeated exposures.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: Arsenic Acid must be regarded as a potential human mutagen, based on animal experimentation.

Embryotoxicity: This product is not reported to produce embryotoxic effects in humans. Specific components of this product may produce embryotoxic effects. See "Teratogenicity" for additional information.

Teratogenicity: Arsenic Acid, a component of this product, must be regarded as a potential human teratogen, based on animal experimentation. Observed effects include decreased fetal weights; however, it is important to note that the specific effects of Arsenic Acid on human teratogenicity have not been well studied.

Reproductive Toxicity: This product is not reported to produce adverse reproductive effects in humans

*A **mutagen** is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance which interferes in any way with the reproductive process.*

ACGIH BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, the following ACGIH Biological Exposure Indices (BEIs) are associated with the components of this product.

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
ARSENIC AND SOLUBLE COMPOUNDS INCLUDING ARSINE • Inorganic arsenic metabolites in urine	• End of workweek	• 50 µg/g creatinine

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Skin disorders may be aggravated by exposure to this product. Overexposures to aerosols, mists, or sprays of this product may aggravate respiratory conditions. Additionally, any disorder involving the "Target Organs" may be aggravated by overexposures to this substance.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure. The following evaluations may be useful: examination of the nose, skin, eyes, nails, and nervous system; urine test for arsenic, kidney or lung function tests.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: The components of this product are relatively stable under ambient, environmental conditions. The compounds will slowly react with other materials (rate being dependent on pH, soil alkalinity, moisture) to form a variety of inorganic compounds. The following environmental data are available for the components of this product:

ARSENIC ACID: Water solubility = 302 g/ 100 mL @ 12.5°C. Bioconcentration Factor: Variable, by species; 0 (trout) to 17 (snail). Microorganisms will convert this substance to other arsenic compounds.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This product is highly toxic and can be fatal to contaminated plants or animals, especially if large volumes are released into the environment. Refer to Section 11 (Toxicology Information) for specific data on the product's components and their effects on test animals. The following data for plants are available for components of this product.

ARSENIC ACID: The roots from bulbs of *Allium cepal* were grown in water to which 1 to 10 ppm arsenic was added (one of the pentavalent forms). The root growth was inhibited in dose-related fashion. When the arsenic was removed, growth inhibition was not seen further. In addition to root growth, cell proliferation also was affected by exposure to 1-3 ppm. The effect on cell proliferation was reversible when arsenic exposure ceased. Doses of 4 ppm or greater caused an irreversible reduction in cell proliferation. Inorganic arsenic (III) at 2,320 µg/l caused 100% kill in two weeks in three algal species, *cladophora*, *spirogyra* and *zygnema*. Studies have also shown it to cause 50% growth inhibition after four days of exposure in the alga, *Selenastrum capricornutum* and at 2,320 µg/l it caused 95% kill in one month to *Potamogeton*.

12. ECOLOGICAL INFORMATION (Continued)

EFFECT OF CHEMICAL ON AQUATIC LIFE: This product is highly toxic and can be fatal to exposed aquatic life. The following aquatic toxicity data are available for components of this product.

ARSENIC ACID:

LC₅₀ (striped bass) = 96 hours, 30.5 - 51.2 mg/L
LC₅₀ (*Daphnia magna*) = 48 hours: 2.4, 4.5 mg/L
LC₅₀ (*Ceriodaphnia reticulata*) = 48 hours, 1.3 mg/L
LC₅₀ (Fathead minnow) = 96 hours, 12.6 - 82.4 mg/L
LC₅₀ (Fathead minnow) = 336 hours, 10.556 mg/L
LC₅₀ (*Ceriodaphnia dubia*) = 48 hours, 1.3 mg/L
LC₅₀ (Brook trout) = 96 hours, 14.96 mg/L
LC₅₀ (Goldfish) = 96 hours, 26.04 mg/L |
LC₅₀ (Goldfish) = 336 hours, 18.618 mg/L |
LC₅₀ (Channel catfish) = 96 hours, 15.0 - 19 mg/L
LC₅₀ (Flagfish) = 96 hours, 14 - 29 mg/L
LC₅₀ (Bluegill) = 96 hours, 15 - 42 mg/L
LC₅₀ (Bluegill) = 336 mg/L, 18.328 mg/L
LC₅₀ (Rainbow trout) = 144 hours, 13.3 mg/L

ARSENIC ACID (Continued):

LC₅₀ (Brook trout) = 262 hours, 10.44 mg/L
LC₅₀ (Spottail shiner) = 72 hours, 27 mg/L
LC₅₀ (Largemouth bass) = 192 hours, 42.1 mg/L
EC₅₀ (Snail, *Aplexa hypnorum*) = 96 hours, 24.5 mg/L
EC₅₀ (*Ceriodaphnia reticulata*) = 48 hours, 1.8 mg/L
EC₅₀ (*Daphnia magna*) = 48 mg/L, 1 - 6 mg/L
EC₅₀ (*Daphnia pulex*) = 48 mg/L, 1 - 2 mg/L
EC₅₀ (*Simocephalus serrulatus*) = 48 hours, 0.812 mg/L
EC₅₀ (*Gammarus pseudolimnaeus*) = 96 hours, 0.874 mg/L
EC₅₀ (Stonefly) = 96 hours = 22.04 mg/L
EC₅₀ (Midge) = 96 hours, 97 mg/L
EC₅₀ (*Daphnia magna*) 48 hours, 1 - 5 mg/L

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations, or those of Canada and its Provinces. This product, if unaltered by use, may be disposed of by treatment at a permitted facility or as advised by your local hazardous waste regulatory authority.

U.S. EPA WASTE NUMBER: The following waste numbers may be applicable: D002, D004 (Arsenic, 5.0 mg/L).

CONTAINER DISPOSAL: Where applicable, triple rinse (or equivalent), then offer the container for recycling or reconditioning. Alternatively, puncture the container and dispose of in a procedure approved by State, Province and local authorities.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION. For shipments containing 1 lb. of Arsenic Acid or more:

PROPER SHIPPING NAME: R.Q. arsenic compounds, liquid, n.o.s.
HAZARD CLASS NUMBER and DESCRIPTION: 6.1 (Toxic)
UN IDENTIFICATION NUMBER: UN 1556
PACKING GROUP: PG II
DOT LABEL(S) REQUIRED: Poison

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER 2000): 152

MARINE POLLUTANT: This compound is listed as a marine pollutant by the D.O.T. (49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian shipments.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: The components of this product are subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, and are listed as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
ARSENIC ACID	NO	YES	YES (as Arsenic Compound)

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Arsenic Acid = 1 lb.

U.S. TSCA INVENTORY STATUS: This product is not subject to the requirements of the TSCA because it is regulated under the Federal Insecticide, Fungicide, and Rodenticide Act.

The OSHA Inorganic Arsenic Standard (29 CFR 1910.1018) is applicable to employee exposures. It is recommended that this Standard be reviewed and the guidelines be implemented where applicable and practical.

U.S. STATE REGULATORY INFORMATION: Components in this product, specifically listed in Section 2 (Composition and Information on Ingredients), are covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: None.

California - Permissible Exposure Limits for Chemical Contaminants: Arsenic Inorganic Compounds).

Florida - Substance List: Arsenic.

Illinois - Toxic Substance List: Arsenic Compounds.

Kansas - Section 302/313 List: Arsenic and Compounds.

Massachusetts - Substance List: Arsenic.

Michigan - Critical Materials Register: Arsenic.

Minnesota - List of Hazardous Substances: Arsenic and Soluble Compounds.

Missouri - Employer Information/Toxic Substance List: Arsenic Acid.

New Jersey - Right to Know Hazardous Substance List: Arsenic Acid.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: Arsenic Acid.

Pennsylvania - Hazardous Substance List: Arsenic.

Rhode Island - Hazardous Substance List: Arsenic.

Texas - Hazardous Substance List: None.

West Virginia - Hazardous Substance List: None.

Wisconsin - Toxic and Hazardous Substances: None.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Arsenic Acid and is on the California Proposition 65 Lists as a chemical known to the State of California to cause cancer, birth defects, and other reproductive harm.

LABELING (Precautionary Statements):

ANSI STANDARD LABEL INFORMATION (Z129.1):

DANGER! POISON! LIQUID AND MIST CAUSE SEVERE IRRITATION TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL OR FATAL IF INHALED. MAY CAUSE LUNG, KIDNEY, LIVER, AND BLOOD DAMAGE. CANCER AND BIRTH DEFECT HAZARD. Risk of cancer depends on duration and level of exposure. Do not get into eyes, on skin or clothing. Avoid prolonged or repeated skin contact. Avoid breathing spray or mist. Do not take internally. Use with adequate ventilation and employ respiratory protection when exposed to the mist or spray. When handling, wear chemical splash goggles, face shield, rubber gloves, protective clothing, and appropriate respiratory protection. Do not transfer to unlabeled containers. Wash thoroughly after handling. Keep container closed when not in use. **FIRST-AID:** POISON. CALL A PHYSICIAN. CONTACT POISON CONTROL CENTER, or CALL 911. In case of contact, immediately flush skin or eyes for at least 15 minutes. If inhaled, move to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If ingested, do not induce vomiting. **IN CASE OF FIRE:** Use dry chemical, CO₂, or alcohol foam. **IN CASE OF SPILL:** Absorb spilled liquid with polypads. Place residue in suitable container. Refer to MSDS for additional information.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: This product is subject to Environment Canada's requirements pertaining to the DSL or NDSL.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: The components of this product are on the CEPA Priorities Substances Lists, as follows: Arsenic Acid (Inorganic Acid Compound, First PSL, Toxic).

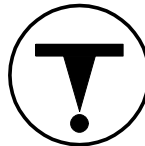
CANADIAN WHMIS SYMBOLS:

Class D1A: Materials Causing Immediate and Serious Toxic Effects

Class D2A/B: Materials Causing Other Toxic Effects

16. OTHER INFORMATION

PREPARED BY: Mineral Research and Development



The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. Chemical Specialties Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, Chemical Specialties Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered. **OSHA** - U.S. Occupational Safety and Health Administration. **PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). **AIHA-WEEL** is the American Industrial Hygiene Association Workplace Environmental Exposure Level Guides. When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]). Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury).

NATIONAL FIRE PROTECTION ASSOCIATION (Continued): Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information:** **BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. **Ecological Information:** **EC** is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **U.S.:** **EPA** is the U.S. Environmental Protection Agency. **DOT** is the U.S. Department of Transportation. **SARA** is the Superfund Amendments and Reauthorization Act. **TSCA** is the U.S. Toxic Substance Control Act. **CERCLA (or Superfund)** refers to the Comprehensive Environmental Response, Compensation, and Liability Act. Labeling is per the American National Standards Institute (**ANSI Z129.1**). **CANADA:** **CEPA** is the Canadian Environmental Protection Act. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **TC** is Transport Canada. **DSL/NDSL** are the Canadian Domestic/Non-Domestic Substances Lists.