



This Safety Data Sheet (SDS) complies with the requirements of the U.S. Federal Occupational Safety and Health Administration Hazard Communication Standard (29 CFR 1910.1200, as updated in 2012), the American National Standards Institute (Z400.1, 1998), and equivalent state Standards. It has also been developed in accordance with the Canadian Workplace Hazardous Materials Standard and the United Nations Globally Harmonized System of Classification of Chemicals, as well as European Union requirements under REACH (Registration, Evaluation, Authorization and Restriction of Chemical substances, per EC 1907/2006) and Directive 91/155/EC. Refer to Section 16 of this document for the definition of terms and abbreviations.

SECTION 1: IDENTIFICATION of the Substance/Mixture and of the Company/Undertaking

1.1 PRODUCT IDENTIFIER:

- PRODUCT NAME: **JAX BLACK BRASS, BRONZE AND COPPER DARKENER**
- SYNONYMS: None
- CHEMICAL NAME/CLASS: Inorganic solution.

1.2 RELEVANT IDENTIFIED USES OF THE MIXTURE OR USES ADVISED AGAINST

- IDENTIFIED USE: Metal Finishing
- USES ADVISED AGAINST: None Specified

1.3 DETAILS OF THE SUPPLIER OF THE SAFETY DATA SHEET

- MANUFACTURER/
SUPPLIER: **JAX Chemical Company**
- ADDRESS: 640 South Fulton Avenue, Mount Vernon, NY 10550
- BUSINESS PHONE: 914-668-1818
- EMERGENCY PHONE: 1-800-424-9300 (CHEMTREC; 24 hours)
+1-703-527-3887 (CHEMTREC, International and Maritime)

1.4 OTHER PERTINENT INFORMATION

- This product is used as part of metal finishing and polishing processes in relatively small volume. This SDS has been developed to address safety concerns affecting small volume handling situations and those involving warehouses and other workplaces where large numbers of these items are stored or distributed.

SECTION 2: HAZARDS IDENTIFICATION

2.1 CLASSIFICATION OF THE SUBSTANCE OR MIXTURE:

REGULATION	CLASSIFICATION
OSHA HAZARD COMMUNICATION (GHS)	Skin corrosion (Category 1A); Serious eye damage (Category 1); Acute toxicity, Oral (Category 4); Acute toxicity, Inhalation (Category 4); Chronic aquatic toxicity (Category 4)
REACH/CLP (GHS)	Skin corrosion (Category 1A); Serious eye damage (Category 1); Acute toxicity, Oral (Category 4); Acute toxicity, Inhalation (Category 4); Chronic aquatic toxicity (Category 4)
EU DIRECTIVES 67/548/EEC; 1999/45/EC	None specifically assigned. The following classification developed based on available data - C [Corrosive]; Xn [Harmful]; N [Dangerous for the Environment]

SECTION 2: HAZARDS IDENTIFICATION (Continued)

2.2 LABEL ELEMENTS:

- OSHA/CLP – BASED ON GLOBALLY HARMONIZED SYSTEM

Symbol: To the right.

Signal Word: Danger.

Hazard statement(s)

- H314: Causes severe skin burns and eye damage.
- H302 + H331: Harmful if swallowed or if inhaled.
- H413: May cause long lasting harmful effects to aquatic life.

Precautionary statement(s)

- P260: Do not breathe dust/fume/gas/mist/ vapours/ spray.
- P264: Wash thoroughly after handling
- P270: Do not eat, drink or smoke when using this product.
- P273: Avoid release into to the environment.
- P280: Wear protective gloves, protective clothing, eye protection/face protection.
- P301 + P330+P331 IF SWALLOWED: Rinse mouth. Do not induce vomiting
- P303+P361+P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
- P310: Immediately call a POISON CENTER.
- P405: Store locked up.
- P501 Dispose of contents/ container to an approved waste disposal plant.



- EC DIRECTIVE SYMBOLS, RISK AND SAFETY PHRASES

Symbol: C [Corrosive]; Xn [Harmful]; N [Dangerous the Environment]

Risk Phrases: [R20/22] Harmful by inhalation and if swallowed. [R: 35]: Causes severe burns.

Safety Phrases [S23]: Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer). [S26]: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. [S36]: Wear suitable protective clothing. [S45]: In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). . [S: 60]: This material and its container must be disposed of as a hazardous waste. [S:61]: Avoid release to the environment



2.3 OTHER PERTINENT DATA ON CHEMICAL AND PHYSICAL HAZARDS:

- EMERGENCY OVERVIEW:

PHYSICAL DESCRIPTION: This is a light blue, odorless solution.

HEALTH HAZARDS: This product is corrosive; overexposures may moderately to severely irritate the skin, eyes, and respiratory system or cause burns, depending on the duration and concentration of exposure. Exposure to sensitive skin and mucous membranes can cause damage to tissue; prolonged exposures can potentially lead to chemical burns.

FIRE HAZARDS: No known fire hazard.

PHYSICAL HAZARDS: Negligible under typical circumstances of use or reasonably anticipated emergency response situations.

ENVIRONMENTAL HAZARDS: This product is may be harmful or fatal to contaminated terrestrial and aquatic lifeforms.

SECTION 2: HAZARDS IDENTIFICATION (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

Health	3	HMIS Personal Protective Equipment Rating: Occupational Use situations: C; Safety glasses and gloves, and body protection suitable to specific circumstances of use.
Flammability	0	
Physical Hazard	0	
Protective Equipment	C	

CANADIAN REGULATORY STATUS

- This product is classified as hazardous under Canadian Controlled Products regulations (SOR-88-66). It is classified as E: Corrosive Material; D2B -Materials Causing Immediate and Serious Toxic Effects. See symbol to right.
- This SDS contains all the information required by the CPR.



SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1/3.2 SUBSTANCES/MIXTURES

COMPONENT	CAS NUMBER	EINECS #	EC Class/Risk Phrases	% (w/w)
Selenious Acid	7783-00-8	231-974-7	None specifically assigned. Classification: T; N Risk Phrases: [R23/25] Toxic by inhalation and if swallowed [R33] Danger of cumulative effects [R51/53]: Toxic to aquatic organisms, may cause long-term adverse effects to the aquatic environment.	Less than 1.0%
Nitric Acid	7697-37-2	231-714-2	Classification: O; C Risk Phrases: [R8]: Contact with combustible material may cause fire. [R35]: Causes severe burns.	Less than 1.0%
Copper Sulfate	7758-98-7	231-847-6	Classification: Xi, Xn, N Risk Phrases: [R22]: Harmful if swallowed. [R36/38]: Irritating to eyes and skin. [R50/53]: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.	Between 0.5% and 2.5%
Aqueous solution, with components that are below 1.0% in concentration (or below 0.1% in concentration for carcinogens, reproductive toxins, respiratory tract sensitizers, and mutagens). All ingredients are listed per the requirements of regulations pertinent to Safety Data Sheet requirements under various regulations.				Balance

SECTION 4: FIRST AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES

Eyes: Flush with copious amounts of water for 15 minutes. "Roll" eyes during flush. Seek medical attention immediately. **Skin:** Flush area with warm, running water for 15 minutes. **Inhalation:** Obtain fresh air. **Ingestion:** Contact a Poison Control Center or physician for instructions.

4.2 MOST IMPORTANT ACUTE AND CHRONIC EXPOSURE SYMPTOMS

- ACUTE:** Depending on the duration of contact, overexposures may mildly to severely irritate the eyes, skin, mucous membranes, and any other exposed tissue. Chemical burns can occur. If low levels of vapors, mists, or sprays of this solution are inhaled, irritation of contaminated areas can cause coughing, nasal congestion and a sore throat. Inhalation of higher levels can cause serious and potentially fatal lung conditions (e.g., pneumonitis, pulmonary edema). If swallowed, the product may cause severe gastrointestinal irritation causing nausea and vomiting (especially if large volumes are swallowed). Ingestion may be fatal.

SECTION 4: FIRST AID MEASURES (Continued)

- **CHRONIC:** Repeated skin exposure can cause dermatitis. Prolonged or repeated inhalation of vapors or mists can cause respiratory disorders. Because of the presence of Selenious Acid, it must be noted that chronic exposure to selenium may cause central nervous system effects, digestive tract disturbances, pallor, and garlic breath. Chronic exposure to selenium may cause pallor, garlic breath, metallic taste, anemia, liver and spleen damage. Chronic selenium poisoning is characterized by loss of hair and nails, skin lesions, and abnormalities of the nervous system.
- **TARGET ORGANS:** Acute: Eyes, skin, respiratory system. Chronic: Skin, respiratory system, central nervous system, liver and spleen damage.

4.3 INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED

- **RECOMMENDATIONS TO PHYSICIANS:** Treat symptoms and eliminate overexposure. The following information should also be considered:

For Basic Treatment: Establish a patient airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist respirations if needed. Administer oxygen by non-rebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary. Monitor for shock and treat if necessary. For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport. Do not use emetics. Activated charcoal is not effective. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Do not attempt to neutralize because of exothermic reaction. Cover skin burns with dry, sterile dressings after decontamination.

For Advanced Treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in respiratory arrest. Early intubation, at the first sign of upper airway obstruction, may be necessary. Positive-pressure ventilation techniques with a bag-valve-mask device may be beneficial. Monitor cardiac rhythm and treat arrhythmias as necessary. Start an IV with D5W TKO. Use lactated Ringer's if signs of hypovolemia are present. Watch for signs of fluid overload. Consider drug therapy for pulmonary edema. For hypotension with signs of hypovolemia, administer fluid cautiously. Consider vasopressors if patient is hypotensive with a normal fluid volume. Watch for signs of fluid overload. Use proparacaine hydrochloride to assist eye irrigation.

- **MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE:** Pre-existing eye, skin conditions and respiratory disorders. Though not likely to occur due to volume and nature of use of product, chronic exposures via inhalation or contact can cause central nervous system, liver, and kidney disorders to be aggravated.

SECTION 5: FIREFIGHTING MEASURES

5.1 EXTINGUISHING MEDIA

- **RECOMMENDED FIRE EXTINGUISHING MEDIA:** Water Spray, Water Jet, Dry Powder, Foam, Carbon Dioxide, Halon, or any other.
- **UNSUITABLE FIRE EXTINGUISHING MEDIA:** None known.

5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE



NFPA FLAMMABILITY CLASSIFICATION: Not flammable.

UNUSUAL HAZARDS IN FIRE SITUATIONS: This product is a corrosive solution. When involved in a fire, this material may produce irritating vapors and toxic gases (e.g., oxides of selenium, nitrogen, and copper). Contact with common metals may generate hydrogen gas.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Not sensitive.

5.3 ADVICE FOR FIREFIGHTERS

Wear Self Contained Breathing Apparatus and full protective equipment for fire response. Move containers from fire area if it can be done without risk to personnel. Otherwise, use water spray to keep fire-exposed containers cool. Contaminated equipment should be rinsed thoroughly with water before returning to service.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES

- **RESPONSE TO INCIDENTAL RELEASES:** Personnel who have received basic chemical safety training can generally handle small-scale releases (e.g., under 1 gallon). Wear gloves, safety glasses when cleaning-up spills. Use caution during clean-up; contaminated floors and items may be slippery.
- **RESPONSE TO NON-INCIDENTAL RELEASES:** In the event of a non-incident release (more than 1 gallon), Minimum Personal Protective Equipment should be **Level C: triple-gloves, chemical resistant apron, boots, and splash goggles and an Air-Purifying respirator with organic vapor cartridge. Level B which includes the use of Self-Contained Breathing Apparatus, should be worn when oxygen levels are below 19.5% or are unknown.** Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue with sodium bicarbonate or other neutralizing agent for acids. Ensure that the contaminated area is neutralized (pH 5-9) before releasing the area.
- **RESPONSE PROCEDURES FOR ANY RELEASE:** Absorb spilled liquid with polypads or other suitable absorbent materials. Neutralize residue or any potentially contaminated item with sodium bicarbonate or sodium bicarbonate solution.

6.2 ENVIRONMENTAL PRECAUTIONS

- Avoid response actions that can cause a release of a significant amount of the substance (1 liter or more) into the environment.

6.3 METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP

- **SPILL RESPONSE EQUIPMENT:** Polypad or other absorbent material. Sodium bicarbonate, as needed, to neutralize area.

6.4 REFERENCES TO OTHER SECTIONS

- **SECTION 8:** For exposure levels and detailed personal protective equipment recommendations.
- **SECTION 13:** For waste handling guidelines.

SECTION 7: HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING

- **HYGIENE PRACTICES:** Keep out of reach of children. Follow good chemical hygiene practices. Do not smoke, drink, eat, or apply cosmetics in the chemical use area. Avoid inhalation of vapors, mists and sprays. Use in well-ventilated area. Avoid contact with skin or eyes. Remove contaminated clothing promptly. Clean up spilled product immediately.
- **HANDLING RECOMMENDATIONS:** Employees must be appropriately trained to use this product safely as needed. **Keep containers closed when not in use.**

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES

- **STORAGE RECOMMENDATIONS:** Ensure all containers are correctly labeled. Store containers away from direct sunlight, sources of intense heat, or where freezing is possible. Store this product away from incompatible chemicals (See Section 10, Stability and Reactivity). Empty containers may contain residual liquid; therefore, empty containers should be handled with care. Material should be stored in secondary containers, or in a diked area, as appropriate. Storage and use areas should be covered with impervious materials. Storage areas should be made of fire-resistant materials. If appropriate, post warning signs in storage and use areas. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

7.3 SPECIFIC END USES

- **RECOMMENDATIONS:** Place product away from children and animals.
- **INDUSTRIAL-SECTOR SPECIFIC SOLUTIONS: PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT --** Follow practices indicated in Section 6 (Accidental Release Measures).

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 CONTROL PARAMETERS

- U.S. NATIONAL EXPOSURE LIMITS:**

COMPONENT	ACGIH TLV	OSHA PEL (ppm)	NIOSH REL (ppm)	OTHER
Selenious Acid (Selenium compounds, as Se).	TWA= 0.2 mg/m ³	TWA= 0.2 mg/m ³	TWA= 0.2 mg/m ³	NE
Nitric Acid	TWA =2 ppm; STEL = 4 ppm	TWA =2 ppm	TWA =2 ppm; STEL = 4 ppm	NE
Copper Sulfate (as Copper and its inorganic compounds)	NE	NE	NE	Sigma Aldrich: TWA = 1 mg/m ³

- INTERNATIONAL EXPOSURE LIMITS:**

COMPONENT	Federal Republic of Germany (DFG) Maximum Concentration Values in the Workplace (MAKs)	OTHER
Selenious Acid (Selenium compounds, as Se).	0.2 mg/m ³ (as Selenium, Inorganic Compounds) (Irritant, Ceiling, Skin)	United Kingdom Workplace Exposure limits: 0.1 mg/m ³
Nitric Acid	NE	United Kingdom Workplace Exposure limits: STEL = 1 ppm
Copper Sulfate (as Copper and its inorganic compounds)	1 mg/m ³	United Kingdom Workplace Exposure limits: TWA = 1 ppm; STEL = 5 ppm

- BIOLOGICAL OCCUPATIONAL EXPOSURE LIMITS:** Not established.
- DERIVED NO EFFECT LEVEL (DNEL):** Not established.
- PREDICTED NO EFFECT CONCENTRATION (PNEC):** Not established.

8.2 EXPOSURE CONTROLS

- ENGINEERING CONTROLS:** Use this product in well-ventilated environment. Safety showers, eye wash stations, and hand-washing equipment should be available.
- RESPIRATORY PROTECTION:** None needed under normal conditions of use. Use NIOSH approved respirators if ventilation is inadequate to control mists. Maintain airborne contaminate concentrations below guidelines listed in this section. If respiratory protection is needed, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EC member states
- HAND PROTECTION:** Neoprene gloves should be used. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this SDS. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, or appropriate Standards of the European Economic Community.
- EYE PROTECTION:** Splash goggles or safety glasses. If more than 1 gallon of this product is to be used, a face shield should be considered. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian Standards, or the European Standard EN166.
- BODY PROTECTION:** Use a body protection appropriate to task (e.g., lab coat, coveralls, or apron). Care should be taken to select protection for potentially exposed areas when splashes, sprays, or prolonged exposure could occur in occupational settings.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES

- (a) **APPEARANCE:** Light blue liquid.
- (b) **ODOR:** No odor.
- (c) **ODOR THRESHOLD:** Not determined.
- (d) **pH:** 1.7.
- (e) **MELTING POINT/FREEZING POINT:** < 0°C (32 °F).
- (f) **INITIAL BOILING POINT AND BOILING RANGE:** > 100°C (212°F).
- (g) **FLASH POINT:** Not applicable.
- (h) **EVAPORATION RATE (water=1):** Approx. 1.
- (i) **FLAMMABILITY:** Not flammable.
- (j) **UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS:** Not applicable.
- (k) **VAPOR PRESSURE (mmHg @ 20°C):** Not determined.
- (l) **VAPOR DENSITY:** Not determined.
- (m) **RELATIVE DENSITY (water=1):** Approx. 1.
- (n) **SOLUBILITY:** Soluble.
- (o) **PARTITION COEFFICIENT: N-OCTANOL/WATER:** Not determined.
- (p) **AUTO-IGNITION TEMPERATURE:** Not determined.
- (q) **DECOMPOSITION TEMPERATURE:** Not determined.
- (r) **VISCOSITY:** Not determined.
- (s) **EXPLOSIVE PROPERTIES:** Not applicable.
- (t) **OXIDIZING PROPERTIES:** Not an oxidizer.

9.2 OTHER INFORMATION

- **VOC (less water & exempt):** Not applicable.
- **WEIGHT% VOC:** Not applicable.

SECTION 10: STABILITY AND REACTIVITY

10.1 REACTIVITY

- Not reactive under typical conditions of use or handling.

10.2 CHEMICAL STABILITY

- Normally stable under standard temperatures and pressures.

10.3 POSSIBILITY OF HAZARDOUS REACTIONS

- This product is not self-reactive, water-reactive, or air-reactive.
- This product will not undergo hazardous polymerization.

10.4 CONDITIONS TO AVOID

- Avoid contact with incompatible chemicals.

10.5 INCOMPATIBLE MATERIALS

- This product is not compatible with strong bases, powdered metals and water-reactive materials.

10.6 HAZARDOUS DECOMPOSITION PRODUCTS

- Products of thermal decomposition of this product can include oxides of selenium, nitrogen, and copper.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 INFORMATION ON TOXICOLOGICAL EFFECTS

- **ACUTE TOXICITY:**
 - **TOXICOLOGY DATA:** The following data are available for the hazardous components in this product listed in Section 3 (Composition/Information on Ingredients).

COPPER SULFATE

LD50 (Oral, mouse) = 369 mg/kg
LD50 (Oral, mouse) = 87 mg/kg
LD50 (Oral, rat) = 300 mg/kg
LD50 (Oral, rat) = 960 mg/kg

NITRIC ACID

LD50 (Oral, rat) >90 mL/kg
LC50 (Inhalation) = 260 mg/m³/minutes
LC50 (Inhalation, rat) = 130 mg/m³/4 hours

SELENIOUS ACID

LD50 (Intravenous-Mouse) 11 mg/kg
LDLo (Oral-Rat) 25 mg/kg
LDLo (Intraperitoneal-Rat) 10 mg/kg
TDLo (Subcutaneous-Rabbit) 4800 ug/kg/14 days-intermittent: Behavioral: food intake (animal); Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol); Nutritional and Gross Metabolic: weight loss or decreased weight gain

SECTION 11: TOXICOLOGICAL INFORMATION (Continued)

- **DEGREE OF IRRITATION:** Moderate to severe especially after prolonged exposure.
- **SENSITIZATION:** Not reported to have skin or respiratory sensitization effects.
- **REVIEW OF ACUTE SYMPTOMS AND EFFECTS:** See Section 2 (Hazards Information) and Section 4 (First-Aid Measures) for details.
 - **EYES:** May cause moderate to severe eye irritation and chemical burns.
 - **SKIN:** May cause moderate to severe skin irritation, and chemical burns.
 - **INHALATION:** May cause mild to severe irritation of membranes of nose, mouth, throat; chemical burns and substantial tissue damage is possible.
 - **INGESTION:** May cause severe irritation and chemical burns of gastrointestinal system; ingestion of may be fatal.

- **CHRONIC TOXICITY:**

- **CARCINOGENICITY STATUS:** The following table summarizes the carcinogenicity listing for the components of this product. "NO" indicates that the substance is not considered to be, or suspected to be, a carcinogen by the listed agency.

CHEMICAL	IARC	NTP	NIOSH	OSHA	OTHER
COPPER SULFATE	NO	NO	NO	NO	For "Copper and its Inorganic Compounds" = EPA-D: Not classifiable as to human carcinogenicity.
NITRIC ACID	NO	NO	NO	NO	NO
SELENIOUS ACID	NO	NO	NO	NO	Selenium Compounds, as Se: EPA-D: Not classifiable as to human carcinogenicity. IARC-3: Unclassifiable as to Carcinogenicity in Humans

- **REPRODUCTIVE TOXICITY INFORMATION:** The components of this product are not reported to cause reproductive effects under typical circumstances of exposure. The following reproductive toxicity data are reported for components of this product:

COPPER SULFATE: TDLo (Oral-Pig) 140 mg/kg; female 1-15 week(s) after conception lactating female 4 week(s) post-birth: Reproductive: Effects on Newborn: biochemical and metabolic; TDLo (Intraperitoneal-Rat) 791 mg/kg/18 weeks-intermittent: Nutritional and Gross Metabolic: weight loss or decreased weight gain; TDLo (Intraperitoneal-Rat) 7500 µg/kg; female 3 day(s) after conception: Reproductive: Fertility: other measures of fertility; TDLo (Subcutaneous-Rat) 12,768 µg/kg; male 1 day(s) pre-mating: Reproductive: Paternal Effects: testes, epididymis, sperm duct; TDLo (Subcutaneous-Mouse) 12,768 µg/kg; male 30 day(s) pre-mating: Reproductive: Paternal Effects: testes, epididymis, sperm duct; TDLo (Intratesticular-Rat) 3192 µg/kg; male 1 day(s) pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count), testes, epididymis, sperm duct; TDLo (Intravenous-Mouse) 3200 µg/kg; female 8 day(s) after conception: Reproductive: Effects on Embryo or Fetus: fetotoxicity (except death, e.g., stunted fetus); Specific Developmental Abnormalities: Central Nervous System, cardiovascular (circulatory) system

- **MUTAGENIC EFFECTS** The components of this product are not reported to cause mutagenic effects under typical circumstances of exposure. The following mutagenicity data have been reported for components of this product:

COPPER SULFATE: Mutation Test Systems-not otherwise (Bacteria-Bacillus subtilis) 400 µmol/L; Sex Chromosome Loss and Nondisjunction (Parenteral-*Drosophila melanogaster*) 1000 ppm; Sex Chromosome Loss and Nondisjunction (Unreported-*Drosophila melanogaster*) 7100 ppm; DNA Damage (Rat-*Ascites tumor*) 500 µmol/L; DNA Damage (Rat-Liver) 1 mmol/L; DNA Inhibition (Intraperitoneal-Mouse) 20 gm/kg; Morphological Transformation (Hamster-Embryo) 80 µmol/L Unscheduled DNA Synthesis (Hamster-Embryo) 200 µmol/L

SELENIOUS ACID: Cytogenetic Analysis (Human-Lymphocyte) 10 mmol/L; Micronucleus Test (Intraperitoneal-Mouse) 10 mg/kg/2 days-continuous.

- **SPECIFIC TARGET ORGAN TOXICITY – SINGLE EXPOSURE:** Not applicable.
- **SPECIFIC TARGET ORGAN TOXICITY – REPEATED EXPOSURE:** May cause damage to organs (liver, kidneys) through prolonged or repeated exposure.

SECTION 11: TOXICOLOGICAL INFORMATION (Continued)

• OTHER INFORMATION

- **TOXICOLOGICALLY SYNERGISTIC PRODUCTS:** None known.
- **ADDITIONAL TOXICOLOGY:** Selenious acid is the most toxic form of selenium, ingestion is almost invariably fatal. Stupor, respiratory depression, hypotension, and death can result several hours post ingestion. Severe hypotension develops secondary both to decreased contractility from a toxic cardiomyopathy and to inappropriately low peripheral vascular resistance. Laboratory abnormalities include thrombocytopenia, moderate hepatorenal dysfunction, and elevated serum kinase levels.

SECTION 12: ECOLOGICAL INFORMATION

12.1 TOXICITY

- Based on available data, this product is anticipated to be harmful or fatal to contaminated terrestrial plants or animals.
- Based on available data, this product is anticipated to be harmful or fatal to contaminated aquatic plants or animals.
- The following aquatic toxicity data are available for components of this product:

COPPER SULFATE: Fish: Rainbow trout: LC50 = 0.1- 2.5 mg/L; 96 Hr; Unspecified; Fish: Bluegill/Sunfish: LC50 = 0.6 mg/L; 48 Hr; 15 mg/L CaCO₃; Fish: Bluegill/Sunfish: LC50 = 8.0 mg/L; 48 Hr; 68 mg/L CaCO₃; Fish: Bluegill/Sunfish: LC50 = 10.0 mg/L; 48 Hr; 100 mg/L CaCO₃; Fish: Bluegill/Sunfish: LC50 = 45.0 mg/L; 48 Hr; 132 mg/L CaCO₃

12.2 PERSISTENCE AND DEGRADABILITY

- Specific environmental fate data for components of this product are as follows:

COPPER SULFATE: Persistence: May persist at toxic levels indefinitely. Biodegradation: No evidence was found to indicate that there is any biotransformation process for copper compounds which would have a significant bearing on the fate of copper in aquatic environments (soluble copper salts). Terrestrial Fate: In soil, Copper Sulfate is partly washed down to lower levels, partly bound by soil components, and partly oxidatively transformed. Aquatic Fate: Several processes determine the fate of copper in the aquatic environment: complex formation, especially with humic substances; sorption to hydrous metal oxides, clays, and organic materials; and bioaccumulation. The formation of complexes with organic ligands modifies the solubility and precipitation behavior of copper such that solid copper species probably do not precipitate under normal circumstances. Furthermore, complexed copper is more easily adsorbed by clay and other surfaces than the free (hydrated) cation. The aquatic fate of copper is highly dependent on such variables as pH, Eh /oxidation-reduction potential in millivolts/, concentrations of organic materials and adsorbents, availability of precipitating iron and manganese oxides, biological activity, and competition with other heavy metals.

12.3 BIOACCUMULATIVE POTENTIAL

- Specific bioaccumulation potential data for components of this product are as follows:

COPPER SULFATE: As an essential nutrient, copper is accumulated by all plants, and animals (The following) bioconcentration factors are the ratio derived from the concentrations of the element in the aquatic organism (in ppm of wet wt) divided by the concentration of the element in water (in ppm) (Tabular data) Algae: *Scenedesmus quadricauda*, 12; *Anabaena variabilis*, 300; *Scenedesmus* sp, 2,400; and *Chlorella* sp, 2,400; Bacteria 630-1,567; plants (marine, and fresh), 1,000; invertebrates (marine), 1,670, and invertebrates (freshwater), 1,000; molluscs, 30,000; insects, 546; Fish (marine), 667, and fish (freshwater), 200 (soluble copper salts).

SELENIOUS ACID: Bioconcentration: It is known that selenium accumulates in living tissues. For example, the selenium content of human blood is about 0.2 ppm. This value is about 1,000 times greater than the selenium found in surface waters on the planet earth. It is clear that the human body does accumulate or concentrate selenium with respect to the environmental levels of selenium. Selenium has been found in marine fish meal at levels of about 2ppm. This amount is around 50,000 times greater than the selenium found in seawater. It seems obvious that marine fish are efficient concentrators of selenium.

12.4 MOBILITY IN SOIL

- It is to be expected this product will have small mobility in soil. Some of the components may get into the soil and, ultimately, the ground water. Product spreads on the water surface.

12.5 RESULTS OF PBT and vPvB ASSESSMENT

- No data are available.

12.6 OTHER ADVERSE EFFECTS

- **ENDOCRINE DISRUPTOR INFORMATION:** No component is reported to be an endocrine disruptor.

SECTION 13: DISPOSAL CONSIDERATION

13.1 WASTE TREATMENT METHODS

- **WASTE HANDLING RECOMMENDATIONS:** Prepare, transport, treat, store, and dispose of waste product according to all applicable local, U.S. State and U.S. Federal regulations, the applicable Canadian standards, or the appropriate standards of the nations of the European Community.

13.2 DISPOSAL CONSIDERATIONS

- **EPA RCRA WASTE CODE:** U204, D002, D010 **EUROPEAN WASTE CODE:** 11 01 06*

SECTION 14: TRANSPORT INFORMATION

14.1,2,3,4: DANGEROUS GOODS BASIC DESCRIPTION AND OTHER TRANSPORT INFORMATION

- **DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIALS SHIPPING REGULATIONS:**

UN/NA Number	Proper Shipping Name	Packing Group	Hazard Class	Label	North American Emergency Response Guide #	Marine Pollutant Status
UN3264	Corrosive liquids, acidic, inorganic, n.o.s. (nitric acid, selenious acid)	III	8	Corrosive	154	Cupric Sulfate (i.e., Copper Sulfate) is designated as a severe Marine Pollutant.

- **Limited Quantity Exceptions [49 CFR 173.154(b)(2)]:** Limited quantities for Class 8, Packing Group III materials have inner packagings not over 5.0 L [1.3 gal] (liquids) net capacity each, packed in strong outer packaging.
- **CANADIAN TRANSPORTATION INFORMATION:** This product is regulated by Transport Canada as dangerous goods under Canadian transportation standards. Refer to above information.
- **IATA DESIGNATION:** This product is regulated as dangerous goods by the International Air Transport Association. Use the following information:

Proper Shipping Name	Passenger and Cargo Aircraft				Cargo Aircraft Only	
	Limited Quantity		Packing Instruction	Max. Qty per PKG	Packing Instruction	Max. Qty per PKG
	Packing Instruction	Max. Qty per PKG				
Corrosive liquid, acidic, inorganic, n.o.s. (nitric acid, selenious acid)	Y841	1L	852	5L	856	60L

- **IMO DESIGNATION:** This product is regulated as dangerous goods by the International Maritime Organization. Use the following information:

Proper Shipping Name	Limited and Excepted Quantity Provisions		Packing		EmS
	Limited Quantities	Excepted Quantities	Instructions	Provisions	
Corrosive liquid, acidic, inorganic, n.o.s. (nitric acid, selenious acid)	5L	E1	P001 LP01	5L	FA-SB

SECTION 14: TRANSPORT INFORMATION (Continued)

- **EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):** This product is consider to be dangerous goods. Use the above information for transport classification.

14.5: ENVIRONMENTAL HAZARDS

- Cupric Sulfate (i.e., Copper Sulfate) is designated as a severe Marine Pollutant.

14.6: SPECIAL PRECAUTIONS FOR USERS

- Not applicable.

14.7: TRANSPORT IN BULK

- Not applicable.

SECTION 15: REGULATORY INFORMATION

15.1: SAFETY, HEALTH, AND ENVIRONMENTAL REGULATIONS SPECIFIC FOR THE SUBSTANCE OR MIXTURE.

• OTHER IMPORTANT U.S. REGULATIONS

- **U .S. SARA THRESHOLD PLANNING QUANTITY:** Nitric Acid = 454 kg (1000 lb); Selenious Acid = 454/4540 kg (1000/10,000 lb);
- **U.S. SARA HAZARD CATEGORIES (SECTION 311/312, 40 CFR 370-21):** ACUTE: Yes; CHRONIC: Yes; FIRE: No; REACTIVE: No; SUDDEN RELEASE: No
- **U.S. CERCLA REPORTABLE QUANTITY (RQ):** Copper Sulfate = 4.54 kg (10 lb); Nitric Acid = 454 kg (1000 lb); Selenious Acid = 4.54 kg (10 lb). Pursuant to the requirements of 40 CFR part 355. Selenious Acid is an extremely hazardous substance (EHS) subject to reporting requirements when stored in amounts in excess of its threshold planning quantity (TPQ) of 454 kg/4540 kg(1,000/10,000 lb).
- **U.S. SARA SECTION 313:** This material contains Nitric acid (CAS# 7697-37-2, 5-20%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
- **U.S. TSCA INVENTORY STATUS:** All components of this product are listed on the TSCA Inventory.
- **CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) STATUS:** Not applicable.

• INTERNATIONAL REGULATIONS

- **CANADIAN DSL/NDL INVENTORY STATUS:** The listed components of this product are on the DSL/NDL Inventory.
- **CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** The components of this product are not on the CEPA Priorities Substances Lists.
- **GERMAN WATER HAZARD CLASSIFICATION:** 2 (hazard to waters)

15.2: CHEMICAL SAFETY ASSESSMENT.

- No information available.

SECTION 16: OTHER INFORMATION

16.1: INDICATION OF CHANGE.

- **CHANGE INDICATED:** Update of OSHA Hazard Communication Standard (29 CFR 1910.1200)
- **ORIGINAL DATE OF ISSUE:** May 27, 1993
- **DATES OF UPDATES:** Jan. 10, 2001; June 22, 2013; Feb. 13, 2014; March 4, 2014

SECTION 16: OTHER INFORMATION (Continued)

16.2: ABBREVIATIONS AND ACRONYMS.

ALL SECTIONS: OSHA: U.S. Federal Occupational Safety and Health Administration. WHMIS: Canadian Workplace Hazardous Materials Standard. GHS: Globally Harmonized System of Classification of Chemical Substances. REACH: European Union regulation, Registration, Evaluation, Authorization and Restriction of Chemical substances.

SECTION 2: CAS Number: Chemical Abstract Service Number, which is used by the American chemical Society to uniquely identify a chemical. EINECS: European Inventory of Existing Commercial Substances.

SECTION 3: HAZARDOUS MATERIALS IDENTIFICATION SYSTEM RATING: This is a rating system used by industry to summarize physical and health hazards to chemical users and was originally developed by the National Paint and Coating Association. 0 = No Significant Hazard. 1 = Slight Hazard. 2 = Moderate Hazard. 3 = Severe Hazard. 4 = Extreme Hazard.

SECTION 5: NFPA: National Fire Protection Association. NFPA FLAMMABILITY CLASSIFICATION: The NFPA uses the flash point (F.P.) and boiling point (BP) to classify flammable or combustible liquids. Class IA: F.P. below 73°F and BP below 100°F. Class IB: F.P. below 73°F and BP at or above 100°F. Class IC: F.P. at or above 73°F and BP at or above 100°F. Class II: F.P. at or above 100°F and below 140°F. Class IIIA: F.P. at or above 140°F and below 200°F. Class IIIB: F.P. at or above 200°F. NFPA HAZARDOUS MATERIALS RATING: This is a rating system used to summarize physical and health hazards to firefighters. 0 = No Significant Hazard. 1 = Slight Hazard. 2 = Moderate Hazard. 3 = Severe Hazard. 4 = Extreme Hazard.

SECTION 8: NE: Not established. ACGIH: American Conference of Government Industrial Hygienists; TWA: Time-Weighted Average (over an 8-hour work day); STEL: Short-Term Exposure Limit (15 minute average, no more than 4-times daily and each exposure separated by one-hour minimally); C: Ceiling Limit (concentration not to be exceeded in a work environment). PEL: Permissible Exposure Limit. NIOSH: National Institute of Occupational Safety and Health; REL: Recommended Exposure Limit; IDLH: Immediately Dangerous to Life and Health Concentrations. *Note*: In July 1992, a court ruling vacated the more protective PELs set by OSHA in 1989. Because OSHA may enforce the more protective levels under the "general duty clause", both the current and vacated levels are presented in this document. ppm: Parts per Million. mg/m³: Milligrams per cubic meter. mppcf: Millions of Particles per Cubic Foot. BEI: Biological Exposure Limit. EL: Exposure Limit (United Kingdom). Federal Republic of Germany (DFG) Maximum Concentration Values in the Workplace (MAKs)

SECTION 9: pH: Scale (0 to 14) used to rate the acidity or alkalinity of aqueous solutions. For example, a pH value of 0 indicates a strongly acidic solution, pH of 7 indicates a neutral solution, and a pH value of 14 indicates an extremely basic solution. FLASH POINT: Temperature at which a liquid generates enough flammable vapors so that ignition may occur. AUTOIGNITION TEMPERATURE: Temperature at which spontaneous ignition occurs. LOWER EXPLOSIVE LIMIT (LEL): The minimal concentration of flammable vapors in air which will sustain ignition. UPPER EXPLOSIVE LIMIT (UEL): The maximum concentration of flammable vapors in air which will sustain ignition. ≈: Approximately symbol.

SECTION 11: CARCINOGENICITY STATUS: NTP: National Toxicology Program. IARC: International Agency for Research on Cancer. REPRODUCTIVE TOXICITY INFORMATION: Mutagen: Substance capable of causing chromosomal damage to cells. Embryotoxin: Substance capable of damaging the developing embryo in an overexposed female. Teratogen: Substance capable of damaging the developing fetus in an overexposed female. Reproductive toxin: Substance capable of adversely affecting male or female reproductive organs or functions. TOXICOLOGY DATA: LD₅₀ or LC₅₀: The Lethal Dose or Lethal Concentration of a substance which will be fatal to a given percentage (xx) of exposed test animals by the designate route of administration. This value is used to access the toxicity of chemical substances to humans. TD₅₀ or TC₅₀: The Toxic Dose or Toxic Concentration of a substance which will cause an adverse effect to a given percentage (xx) of exposed test animals by the designate route of administration.

SECTION 13: RCRA: Resource Conservation and Recovery Act. The regulations promulgated under this act under Act are found in 40 CFR, Sections 260 ff, and define the requirements of hazardous waste generation, transport, treatment, storage, and disposal. EPA RCRA Waste Codes: Defined in 40 CFR Section 261.

SECTION 15: CERCLA: Comprehensive Environmental Response Compensation and Liability Act (a.k.a. "Superfund") and SARA: (Superfund Amendment and Reauthorization Act). The regulations promulgated under this Act are located under 40 CFR 300 ff. and provide "community right-to-know" requirements. DSL/NDL: Canadian Domestic Substances and Non-Domestic Substances Lists.

16.3: KEY LITERATURE REFERENCES AND SOURCES FOR DATA

- SAFETY DATA SHEETS FOR COMPONENT PRODUCTS and Southern BioTech formulation.
- Regulations (EC) No 1907/2006, 1272/2008 & 453/2010 of the European Parliament and of the Council.
- Federal OSHA Hazard Communication Standard: 29 CFR 1910.1200
- SAX – Dangerous Properties of Industrial Materials
- RTECS – Registry of Effects of Toxic Chemicals
- ESI -European chemical Substances Information System <http://esis.jrc.ec.europa.eu/>

16.4: CLASSIFICATION AND PROCEDURE USED TO DERIVE THE CLASSIFICATIONS FOR MIXTURES

- **CLASSIFICATION**: Section 2 (Hazards Information) provides all relevant classification information used for this product. The assignments were based on data available for the component products, calculations, expert judgment, and weight of evidence.