



Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

SECTION 1: CHEMICAL PRODUCT - COMPANY IDENTIFICATION

TETRA Micronutrients

230 Spring Hill Dr., Suite 310
The Woodlands, Texas 77386
(281) 419-9430
(800) 521-9979

(800) 424-9300 - CHEMTREC (24 Hour Emergency Response)

SUBSTANCE: Chelated Micronutrient Solution

TRADE NAMES/SYNONYMS: None

CHEMICAL FAMILY: Inorganic Salt

MSDS CREATION DATE: 22 Mar 05

MSDS REVISION DATE: 14 Nov 08

SECTION 2: COMPOSITION, INFORMATION ON INGREDIENTS

The composition of this product is proprietary. This product or one or more of its components is/are hazardous as defined in 29 CFR 1910.1200. In the event of a medical emergency, spill or fire, compositional information will be revealed to responding emergency personnel.

COMPONENTS: Zinc Sulfate, Manganese Sulfate, Ferrous Sulfate, Boric Acid, Citric Acid, Ethylene Diamine Tetracetic Acid (EDTA) and Water

CAS NUMBER: 7664-41-7* (Anhydrous Ammonia), 7704-34-9* (Sulfur), 7440-42-8* (Boron), 7439-89-6* (Iron), 7439-96-5* (Manganese), 7440-66-6* (Zinc), 7732-18-5* (Water)

*All ingredients listed are in chelated form

PERCENTAGE: Proprietary

PROBABLE CONTAMINANT: Not known

SECTION 3: HAZARDS IDENTIFICATION

NFPA RATINGS: (SCALE 0-4): HEALTH=3, FIRE=0, REACTIVITY=0

EMERGENCY OVERVIEW: Clear, light brown to brown liquid with a strong ammonia odor. Maybe harmful if ingested but not expected to be a pathway in an agricultural/industrial environment. Liquid or mist may be irritating to the respiratory tract. Contact with eyes can cause burns. Exposure to the skin can cause burns and/or dryness with possible irritation. Avoid contact with eyes and/or skin. Wash thoroughly after handling. Work in well ventilated area.

POTENTIAL HEALTH EFFECTS:

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

INHALATION:

Short Term Effects: May cause irritation of the nasal membranes and upper respiratory tract. Additional effects may include difficulty breathing, low blood pressure, dizziness, bluish skin color, metallic taste, lose of voice, digestive and lung congestion.

Long Term Effects: In addition to short term exposure, digestive disorders may occur.

SKIN CONTACT:

Short Term Effects: May cause burns and/or dryness and irritation, possibly severe.

Long Term Effects: Same effects as short term exposure.

EYE CONTACT:

Short Term Effects: Contact may cause burns, possibly severe. Additional effects may include irritation, tearing and/or blurred vision.

Long Term Effects: Same effects as short term exposure.

INGESTION:

Short Term Effects: Not expected to be a pathway in an agricultural/industrial environment. May be fatal if swallowed. May cause burns. Additional effects may include fever, nausea, vomiting, diarrhea, stomach pain, blood in the stool, inability to urinate, low blood pressure, kidney damage, liver damage and convulsions.

Long Term Effects: Same effects as reported in short term ingestion.

CARCINOGEN STATUS:

OSHA: No **NTP:** No **IARC:** No

SECTION 4: FIRST AID MEASURES

INHALATION: Remove from exposure area to fresh air immediately. If breathing is difficult, give oxygen. Oxygen must be administered by properly trained personnel. If breathing has stopped, perform artificial resuscitation. Keep person warm and at rest. Treat symptomatically and supportively. Get medical attention immediately.

SKIN CONTACT: Remove contaminated clothing, jewelry, and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of product remains (at least 15-20 minutes). If burns occur, proceed with the following: cover affected area securely with sterile, dry, loose-fitting dressing. Treat symptomatically and supportively. Get medical attention immediately.

EYE CONTACT: Flush eyes immediately with large amounts of water or normal saline solution, occasionally lifting upper and lower lids until no evidence of product remains (approximately 15-20 minutes). Cover with sterile bandages. Get medical attention immediately.

INGESTION: Dilute the product immediately with large amounts of water or milk and remove by gastric lavage unless the victim is already vomiting (Dreisbach, Handbook of Poisoning, 12th Ed.). Administration of gastric lavage should be performed by qualified medical personnel. If vomiting

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

occurs, keep head lower than hips to prevent aspiration. Treat symptomatically and supportively. Get medical attention immediately.

NOTE TO PHYSICIAN: Antidote: The antidote, for poisoning from zinc salts recommended, is from Dreisbach, Handbook of Poisoning, 12th Edition. However, the decision as to whether the severity of poisoning requires administration of any antidote and actual dose required should be made by qualified medical personnel.

SECTION 5: FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARD: Negligible fire and explosion hazard when exposed to heat or flame.

EXTINGUISHING MEDIA: Dry chemical, carbon dioxide, water spray or regular foam, as appropriate for surrounding material. For larger fires, use water spray, fog or regular foam (1996 North American Emergency Response Guidebook, RSPA P 5800.7, Guide Number 171).

FIREFIGHTING: Move product from fire area if you can without risk. Extinguish fire using agent suitable for type of surrounding fire and/or chemicals. Do not use water directly on material. Avoid breathing vapors; keep upwind. Dike area to prevent runoff and contamination of water sources.

HAZARDOUS COMBUSTION PRODUCTS: Thermal decomposition may include toxic and hazardous oxides of zinc, sulfur, nitrogen and chloride.

SECTION 6: ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL SPILL: Do not touch spilled material. Stop leak if you can without risk. For small spills, take-up with sand or other absorbent material and place in containers for disposal. For larger spills, dike far ahead of spill for later disposal. Move containers from spill area if possible. Wear personal protective equipment. Deny entry to nonessential personnel and isolate hazard. Wash thoroughly after handling. Use with adequate ventilation.

SECTION 7: HANDLING AND STORAGE

Observe all federal, state and local regulations when storing this product. Avoid outdoor storage. It is recommended that storage and transfers of this product be done on an impervious surface. Store in a tightly closed container. Store away from incompatible materials.

SECTION 8: EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS (as zinc sulfate): No occupational exposure limits have been established by OSHA/ACGIH/NIOSH.

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

EXPOSURE LIMITS (components):

- No occupational exposure limits have been established by OSHA/ACGIH/NIOSH for Zinc Sulfate.
- Exposure limits for **Ammonia**:
 - 50 ppm (35 mg/m³) OSHA TWA
 - 35 ppm (27 mg/m³) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
 - 25 ppm (18 mg/m³) ACGIH TWA
 - 35 ppm (27 mg/m³) ACGIH STEL
 - 25 ppm (18 mg/m³) NIOSH recommended TWA 10 hour(s)
 - 35 ppm (27 mg/m³) NIOSH recommended STEL
 - 35 mg/m³ (50 ml/m³) DFG MAK 1 times/shift
 - 25 ppm (18 mg/m³) UK OES TWA
 - 35 ppm (25 mg/m³) UK OES STEL

EXPOSURE LIMITS (Manganese and/or Manganese Compounds):

- 5 mg (Mn)/m³ OSHA ceiling
- 5 mg (Mn)/m³ ACGIH ceiling dust
- 1 mg (Mn)/m³ ACGIH TWA (fume)
- 3 mg (Mn)/m³ ACGIH STEL (fume)
- No occupational exposure limits have been established by OSHA/ACGIH/NIOSH for Proprietary Organic Acids.

VENTILATION: Provide local exhaust or process enclosure ventilation.

EYE PROTECTION: Wear safety glasses with splash shields or safety goggles/shield to prevent contact with this product.

EMERGENCY WASH FACILITIES: Where there is any possibility that an employee's eyes and/or skin may be exposed to this product, the employer should provide an eye wash fountain and quick drench shower within the immediate work area for emergency use.

CLOTHING: Wear appropriate protective clothing and equipment to prevent repeated or prolonged skin contact with this product. Although skin contamination is not generally a problem, it increases the possibility of ingestion through poor personnel hygiene. Contaminated work clothing and shoes should not be taken from the workplace.

GLOVES: Wear appropriate protective gloves to prevent contact with this product.

RESPIRATOR: The respirator selected must be based on contamination levels found in the work place and specific to the job assignment. Do not exceed the working limits of the respirator. Respiratory protection is ranked in order from minimum to maximum. Respirators must also be jointly approved by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration (NIOSH-MSHA).

- Any dust and mist respirator with a full facepiece;
- Any air-purifying full facepiece respirator with an organic vapor cartridge;
- Any powered air-purifying respirator with a tight-fitting facepiece and an organic vapor cartridge;

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

- Any type “C” supplied-air respirator with a full facepiece operated in a pressure-demand or other positive pressure mode or with a full facepiece, helmet or hood operated in continuous-flow mode;
- Any self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.
- Escape-any air-purifying, full facepiece respirator with a high-efficiency particulate filter or any appropriate escape-type, self-contained breathing apparatus.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS: Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

DESCRIPTION: Clear, light brown to brown liquid with strong ammonia odor.

pH: 8.5 to 10.0

MELTING POINT: Not applicable

BOILING POINT: N/A

WATER SOLUBILITY: Dilution with greater than 7 parts of water may cause precipitation of zinc hydroxide

SPECIFIC GRAVITY (water = 1.0): (1.29 @ 68° F)

SECTION 10: STABILITY AND REACTIVITY

REACTIVITY: Stable under normal temperatures and pressures.

CONDITIONS TO AVOID: Avoid contact with strong oxidizers, acids and/or excessive heat. Dangerous gases may accumulate in confined spaces.

INCOMPATIBILITIES: Oxidizing materials, acids, metals, metal oxides, acids, bases, cyanides, reducing agents, and halogens.

HAZARDOUS DECOMPOSITION: Thermal decomposition products may include toxic and hazardous oxides of zinc, sulfur, nitrogen and carbon.

POLYMERIZATION: Has not been reported to occur under normal temperatures and pressures.

SECTION 11: TOXICOLOGICAL INFORMATION

TOXICITY DATA:

Zinc Sulfate: LD50 oral-rat, 2949 mg/kg

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

HEALTH EFFECTS (Manganese Sulfate):

INHALATION: 10,000 ppm (Mn) immediately dangerous to life or health.

Acute Exposure: Exposure to the dust of manganese compounds may cause irritation of the mucous membranes with symptoms of coughing and shortness of breath. This material may be absorbed into the blood stream and deposited into the liver, spleen, brain and other organs where it accumulates.

Chronic Exposure: Repeated exposure to the dust of manganese compounds anywhere from 3 months to 2 years may produce chronic manganese poisoning. The early stage of this disease is insidious with symptoms of apathy, anorexia, asthenia, headache, hypersomnia, spasms, weakness of the legs, arthralgias and irritability. As the disease progresses into the intermediate phase, psychosis develops with symptoms of visual hallucinations, double vision, impaired hearing, uncontrollable impulses, mental confusion, and euphoria. In the last stage of the disease, neurological disturbances develop that simulate Parkinson's disease. These disturbances include excessive salivation, muscle weakness, muscle rigidity, tremor of upper extremities and head, and impaired gait. The severity of chronic manganese poisoning depends upon the length of exposure and the stage of the disease when exposure is terminated. The prognosis is more favorable in the young and in those with only a few years exposure. Chronic manganese poisoning is not a fatal disease but it can be extremely disabling.

SKIN CONTACT:

Acute Exposure: May cause irritation.

Chronic Exposure: No data available.

EYE CONTACT:

Acute Exposure: May cause redness and irritation.

Chronic Exposure: Repeated or prolonged contact may cause irritation and conjunctivitis.

INGESTION:

Acute Exposure: Manganese compounds may cause gastrointestinal disturbances with abdominal pain and nausea. Large inhaled particles may be cleared from the respiratory tract and swallowed. The rate of absorption can be influenced by the dietary level of manganese and iron, the type of manganese compound, iron deficiency and age. However, the risk of intoxication by this route is not considered great.

Chronic Exposure: No data available.

CARCINOGEN STATUS: Insufficient Information

LOCAL EFFECTS: Corrosive: Inhalation, skin, eye, ingestion.

ACUTE TOXICITY LEVEL: Toxic by ingestion.

TARGET EFFECTS: Poisoning may affect the liver, kidneys, and immune system (sensitizer).

HEALTH EFFECTS:

INHALATION:

Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

Acute Exposure: Inhalation of mist/dust may cause irritation or the respiratory tract with sore throat, coughing, shortness or breath, labored breathing, pain in the nose, mouth, and throat, and burns of the mucous membranes. If sufficient quantities are inhaled, pulmonary edema may develop, often with a latent period of 5 - 72 hours. The symptoms may include tightness in the chest, dyspnea, frothy sputum, cyanosis, and dizziness. Physical findings may include weak, rapid pulse, hypotension, hemoconcentration, and moist rales.

Chronic Exposure: Depending on the concentration and duration of exposure, repeated or prolonged exposure may cause inflammatory and ulcerative changes in the mouth and possibly bronchial and gastrointestinal disturbances.

SKIN CONTACT:

Acute Exposure: Direct contact may cause severe irritation, redness, pain, and possibly burns.

Chronic Exposure: Effects depend on concentration and duration of exposure. Repeated or prolonged contact with metal salts may result in dermatitis with erythematous, papular, and granulomatous reactions in susceptible individuals or effects similar to acute exposure.

EYE CONTACT:

Acute Exposure: Direct contact may cause severe irritation, redness, pain, blurred vision, and burns, possibly severe. The degree of injury depends on the concentration and duration of contact. The full extent of the injury may not be immediately apparent. Application of a 20% zinc sulfate solution to corneas infected with herpetic keratitis ulcers resulted in edema and residual scarring upon healing.

Chronic Exposure: Effects depend on concentration and duration of exposure. Repeated or prolonged contact may result in conjunctivitis or effects as in acute exposure.

INGESTION:

Acute Exposure: Ingestion may cause a burning pain in the mouth and throat, fever, nausea, violent vomiting with severe abdominal pain, watery or bloody diarrhea, prostration, tenemus, retching, hyperglycemia, anuria, liver damage, kidney damage with albuminuria, acetonuria, and glycosuria, hypotension, sudden collapse, and convulsions.

Chronic Exposure: Depending on the concentration, repeated ingestion may cause effects as with acute ingestion. Prolonged ingestion of 33,000 mg/kg in drinking water resulted in severe anemia in mice. Reproductive effects have been reported in animals (anhydrous).

SECTION 12: ECOLOGICAL INFORMATION

ENVIRONMENTAL IMPACT RATING (0-4): No data available

ACUTE AQUATIC TOXICITY: 1000-10,000 ug/L 96 hour (s) LC50 (Mortality) Sheepshead Minnow (Cyprinodon variegatus), 10,000 ug/L NR hour (s) (Mortality) Crayfish (Astacus leptodactylus), 10 ug/L 7 hour (s) LC50 (Mortality) Narrow mouthed frog (Microhyla carolinensis)

DEGRADABILITY: No data available



Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

LOG BIOCONCENTRATION FACTOR (BCF): 10768 ug/L 140 hour (s) BCF (Residue) Toothed wrack (*Fucus serratus*), 34,000 M 4-96 hour (s) BCF (Residue) Diatom (*Thalassiorira guillardii*)
LOG OCTANOL/WATER PARTITION COEFFICIENT: No data available

SECTION 13: DISPOSAL INFORMATION

Observe all federal, state and local regulations when disposing of this product.

SECTION 14: TRANSPORT INFORMATION

Not regulated by DOT for ground transportation in containers <978 gallons. For containers > 978 gallons RQ, Environmentally Hazardous Substances, Liquid N.O.S., (Zinc Sulfate), 9 UN 3082, PG III "ERG #171"

SECTION 15: REGULATORY INFORMATION

	TSCA STATUS (components):	Yes
40 CFR 302.4	CERCLA SECTION 103:	Yes
40 CFR 355.30	SARA SECTION 302:	Yes
40 CFR 355.40	SARA SECTION 304:	Yes
40 CFR 372.65	SARA SECTION 313:	Yes
29 CFR 1910.119	OSHA Process Safety:	Yes
	California Proposition 65:	Yes
40 CFR 370.21	SARA HAZARD CATEGORIES, SARA SECTIONS 311/312	
	ACUTE HAZARD:	Yes
	CHRONIC HAZARD:	Yes
	FIRE HAZARD:	No
	REACTIVITY HAZARD:	No
	SUDDEN RELEASE HAZARD:	No



Material Safety Data Sheet

This MSDS complies with the style format specified by ANSI Z400.1 - 1993

SECTION 16: OTHER INFORMATION

Individuals handling this product should be informed of the recommended safety precautions and should have access to this information.

This information relates to the specific product designated and may not be valid for such product used in combination with any other materials or in any other processes. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability, or completeness. It is the user's responsibility to satisfy themselves as to the suitability and completeness of such information for their own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

TETRA Micronutrients reserves the right to refuse shipment of this product to any consumer who fails to demonstrate the ability to consistently handle and use it safely and in compliance with all applicable laws, rules and regulations. Such demonstration may require on-site inspection of any or all storage, processing, packaging and other handling systems that come in contact with it.

Customers are responsible for compliance with local, state and federal regulations that may be pertinent in the storage, application and disposal of this product.