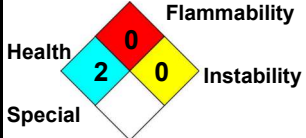





Material Safety Data Sheet

NFPA	HMIS	WHMIS	TDG	DOT								
	<table border="1"> <tr><td>Health</td><td>2</td></tr> <tr><td>Flammability</td><td>0</td></tr> <tr><td>Physical hazards</td><td>0</td></tr> <tr><td>Suggested PPE</td><td>H</td></tr> </table>	Health	2	Flammability	0	Physical hazards	0	Suggested PPE	H			
Health	2											
Flammability	0											
Physical hazards	0											
Suggested PPE	H											

1 . Product and Company Identification

Product name PRO Manganese 5	
Synonym	MSDS prepared by the Environment, Health & Safety Department on: 3/8/2012.
Material uses Soil additive, micronutrient mix, fertilizer	Version 1
MSDS Number 35614, 35814	<u>In Case of Emergency</u> Transportation: 1-800-792-8311 Medical: 1-888-615-0015
Manufacturer Agrium Advanced Technologies Fairbury Micronutrients 56906 Hwy 8 Fairbury, NE 68352	For more information on Agrium AT or our products, please go to: http://www.agriumat.com or contact us at Toll-Free:800-461-6471

2 . Hazards Identification

Physical state	Liquid.
Odor	Ammoniacal. [Slight]
OSHA/HCS status	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	<p>WARNING!</p> <p>CAUSES EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.</p> <p>Severely irritating to eyes. Irritating to skin. Do not get in eyes. Avoid breathing vapor or mist. Avoid contact with skin and clothing. Contains material that may cause target organ damage, based on animal data. Wash thoroughly after handling.</p>
Routes of entry	Ingestion. Inhalation (mists) Dermal contact.
<u>Potential acute health effects</u>	
Inhalation	May irritate the respiratory tract if inhaled.
Ingestion	May be harmful if swallowed.
Skin	Irritating to skin.
Eyes	Severely irritating to eyes. Risk of serious damage to eyes.
<u>Potential chronic health effects</u>	
Chronic effects	No known significant effects or critical hazards.
Carcinogenicity	No known significant effects or critical hazards.

2. Hazards Identification

Mutagenicity	No known significant effects or critical hazards.
Teratogenicity	No known significant effects or critical hazards.
Developmental effects	No known significant effects or critical hazards.
Fertility effects	No known significant effects or critical hazards.
Target organs	Contains material which may cause damage to the following organs: blood, kidneys, lungs, upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea.

Over-exposure signs/symptoms

Inhalation	No specific data.
Ingestion	No specific data.
Skin	Adverse symptoms may include the following: irritation redness
Eyes	Adverse symptoms may include the following: pain or irritation watering redness
Medical conditions aggravated by over-exposure	Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

3. Composition / Information on Ingredients

United States

<u>Name</u>	<u>CAS number</u>	<u>%</u>
citric acid	77-92-9	10 - 20
manganese sulphate	7785-87-7	10 - 20
ammonia, anhydrous	7664-41-7	5 - 10

Canada

<u>Name</u>	<u>CAS number</u>	<u>%</u>
citric acid	77-92-9	10 - 20
manganese sulphate	7785-87-7	10 - 20
ammonia, anhydrous	7664-41-7	5 - 10

Mexico

<u>Name</u>	<u>CAS number</u>	<u>UN number</u>	<u>%</u>	<u>IDLH</u>	<u>Classification</u>			
					<u>H</u>	<u>F</u>	<u>R</u>	<u>Special</u>
citric acid	77-92-9	Not available.	10 - 20	-	2	0	0	
manganese sulphate	7785-87-7	Not available.	10 - 20	500 mg/m ³	2	0	0	
ammonia, anhydrous	7664-41-7	UN1954	5 - 10	300 ppm	1	4	0	

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4 . First Aid Measures

Eye contact	Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical advice if symptoms or conditions persist.
Skin contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Seek medical advice if irritation or symptoms persist.
Inhalation	If inhalation occurs, remove individual(s) to fresh air. Loosen restrictive clothing items if necessary. If individual has irregular or difficulty breathing or is under respiratory arrest seek medical attention immediately. If other conditions or symptoms develop contact a physician.
Ingestion	If ingestion occurs, rinse mouth with copious amounts of water. Do Not induce vomiting unless directed to do so by trained medical personnel. Do Not give anything by mouth to unconscious individuals. Seek immediate medical attention.
Protection of first-aiders	No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
Notes to physician	In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

5 . Fire-fighting Measures

Flammability of the product	In a fire or if heated, a pressure increase will occur and the container may burst.
<u>Extinguishing media</u>	
Suitable	Use an extinguishing agent suitable for the surrounding fire.
Not suitable	None known.
Special exposure hazards	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Hazardous thermal decomposition products	Decomposition products may include the following materials: carbon dioxide carbon monoxide nitrogen oxides sulfur oxides metal oxide/oxides
Special protective equipment for fire-fighters	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
Special remarks on fire hazards	No additional remark.
Special remarks on explosion hazards	No additional remark.

6 . Accidental Release Measures

Personal precautions	No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
Environmental precautions	Avoid dispersal of spilled material and runoff into waterways, drains, and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers or waterways).
Methods for cleaning up	
Small spill	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
Large spill	Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and Storage

Handling	Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
Storage	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Keep out of reach of children.

8 . Exposure Controls / Personal Protection

United States

Ingredient	Exposure limits
manganese sulphate	<p>NIOSH REL (United States, 6/2009). TWA: 1 mg/m³, (as Mn) 10 hour(s). Form: Fume STEL: 3 mg/m³, (as Mn) 15 minute(s). Form: Fume</p> <p>ACGIH TLV (United States, 2/2010). TWA: 0.2 mg/m³, (as Mn) 8 hour(s).</p> <p>OSHA PEL (United States, 6/2010). CEIL: 5 mg/m³, (as Mn)</p>
ammonia, anhydrous	<p>ACGIH TLV (United States, 2/2010). TWA: 25 ppm 8 hour(s). TWA: 17 mg/m³ 8 hour(s). STEL: 35 ppm 15 minute(s). STEL: 24 mg/m³ 15 minute(s).</p>

8 . Exposure Controls / Personal Protection

OSHA PEL (United States, 6/2010).

TWA: 50 ppm 8 hour(s).

TWA: 35 mg/m³ 8 hour(s).

Canada

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			Notations
Ingredient	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	
manganese sulphate, as Mn	US ACGIH 2/2010	-	-	0.2	-	-	-	-	-	-	
	AB 4/2009	-	-	0.2	-	-	-	-	-	-	
ammonia, anhydrous	BC 9/2010	-	-	0.2	-	-	-	-	-	-	[a]
	ON 7/2010	-	-	0.2	-	-	-	-	-	-	
	QC 6/2008	-	-	5	-	-	-	-	-	-	
	US ACGIH 2/2010	25	-	17	35	24	-	-	-	-	
	AB 4/2009	25	-	17	35	24	-	-	-	-	
	BC 9/2010	25	-	-	35	-	-	-	-	-	
	ON 7/2010	25	-	17	35	24	-	-	-	-	
	QC 6/2008	25	-	17	35	24	-	-	-	-	

[3]Skin sensitization

Form: [a]Total dust.

Mexico

Ingredient	Exposure limits
manganese sulphate	NOM-010-STPS (Mexico, 9/2000). LMPE-PPT: 0.2 mg/m ³ , (as Mn) 8 hour(s).
ammonia, anhydrous	NOM-010-STPS (Mexico, 9/2000). LMPE-PPT: 25 ppm 8 hour(s). LMPE-PPT: 18 mg/m ³ 8 hour(s). LMPE-CT: 27 mg/m ³ 15 minute(s). LMPE-CT: 35 ppm 15 minute(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures	If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
Engineering measures	No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.
Hygiene measures	Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
Hands	Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
Eyes	Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, or mists.

8 . Exposure Controls / Personal Protection

Skin Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9 . Physical and Chemical Properties

Physical state	Liquid.
Color	Opaque, red-brow [Light]
Odor	Ammoniacal. [Slight]
pH	9
Boiling/condensation point	76.7°C (170.1°F)
VOC	0 % (w/w)
Solubility	Soluble

10 . Stability and Reactivity

Chemical stability	The product is stable.
Possibility of hazardous reactions	Under normal conditions of storage and use, hazardous reactions will not occur.
Hazardous polymerization	Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to avoid	No specific data.
Materials to avoid	No specific data.
Hazardous decomposition products	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11 . Toxicological Information

United States

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
citric acid	LD	Rat	382 mg/kg	-
	Intraperitoneal			
	LD Oral	Rat	8300 mg/kg	-
	LD50	Rat	290 mg/kg	-
	Intraperitoneal			
	LD50 Oral	Rat	3 g/kg	-
	LD50 Oral	Rat	11700 mg/kg	-
	LD50	Rat	5500 mg/kg	-
manganese sulphate	LD50 Oral	Rat - Male,	2150 mg/kg	-
		Female		
ammonia, anhydrous	TDLo Oral	Rat	0.095 g/kg	-

11 . Toxicological Information

	LC50 Inhalation Vapor	Rat	18600 mg/m3	5 minutes
	LC50 Inhalation Vapor	Rat	7040 mg/m3	30 minutes
	LC50 Inhalation Gas.	Rat	17401 ppm	15 minutes
	LC50 Inhalation Gas.	Rat	9500 ppm	1 hours
	LC50 Inhalation Gas.	Rat	2000 ppm	4 hours
diiron tris(sulphate)	LD50 Oral	Rat - Male, Female	3200 mg/kg	-
	LD50 Oral	Rat - Male, Female	>2000 mg/kg	-

Conclusion/Summary May be toxic to humans and animals.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
citric acid	Eyes - Severe irritant	Rabbit	-	24 hours 750 Micrograms	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	0.5 Milliliters	-
manganese sulphate	Skin - Erythema/Eschar	Rabbit	0	4 hours	72 hours
	Skin - Edema	Rabbit	0	4 hours	72 hours
	Eyes - Cornea opacity	Rabbit	36	24 hours	-
diiron tris(sulphate)	Skin - Erythema/Eschar	Rabbit	0	4 hours	14 days
	Skin - Erythema/Eschar	Rabbit	3	72 hours	14 days

Conclusion/Summary Not available.

Skin May be irritating to the skin.

Eyes Severe Irritant

Respiratory May be a respiratory irritant

Sensitizer

Product/ingredient name	Route of exposure	Species	Result
manganese sulphate	skin	Human	Not sensitizing

Conclusion/Summary Not available.

Skin Not considered a sensitizer

Respiratory Not considered a sensitizer

Carcinogenicity

Product/ingredient name	Result	Species	Dose	Exposure
None identified.				

Conclusion/Summary Not classified as carcinogenic, teratogenic and mutagenic

11. Toxicological Information

Mutagenicity

Product/ingredient name	Test	Experiment	Result
None identified.			

Conclusion/Summary Not classified as carcinogenic, teratogenic and mutagenic

Teratogenicity

Product/ingredient name	Result	Species	Dose	Exposure
None identified.				

Conclusion/Summary Not classified as carcinogenic, teratogenic and mutagenic

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Development toxin	Species	Dose	Exposure
None identified.						

Conclusion/Summary Not considered to be toxic to the reproductive system.

Canada

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
citric acid	LD	Rat	382 mg/kg	-
	Intraperitoneal			
	LD Oral	Rat	8300 mg/kg	-
	LD50	Rat	290 mg/kg	-
	Intraperitoneal			
	LD50 Oral	Rat	3 g/kg	-
	LD50 Oral	Rat	11700 mg/kg	-
	LD50	Rat	5500 mg/kg	-
manganese sulphate	Subcutaneous			
	LD50 Oral	Rat - Male, Female	2150 mg/kg	-
ammonia, anhydrous	TDLo Oral	Rat	0.095 g/kg	-
	LC50 Inhalation	Rat	18600 mg/m3	5 minutes
	Vapor			
	LC50 Inhalation	Rat	7040 mg/m3	30 minutes
	Vapor			
	LC50 Inhalation	Rat	17401 ppm	15 minutes
	Gas.			
	LC50 Inhalation	Rat	9500 ppm	1 hours
diiron tris(sulphate)	Gas.			
	LC50 Inhalation	Rat	2000 ppm	4 hours
	Gas.			
	LD50 Oral	Rat - Male, Female	3200 mg/kg	-
	LD50 Oral	Rat - Male, Female	>2000 mg/kg	-

Conclusion/Summary May be toxic to humans and animals.

Chronic toxicity

Conclusion/Summary Not available.

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
citric acid	Eyes - Severe	Rabbit	-	24 hours 750	-

11 . Toxicological Information

manganese sulphate	irritant			Micrograms	
	Skin - Mild irritant	Rabbit	-	24 hours 500	-
	irritant			milligrams	
	Skin - Moderate irritant	Rabbit	-	0.5 Milliliters	-
diiron tris(sulphate)	Skin - Erythema/Eschar	Rabbit	0	4 hours	72 hours
	Skin - Edema	Rabbit	0	4 hours	72 hours
	Eyes - Cornea opacity	Rabbit	36	24 hours	-
	Skin - Erythema/Eschar	Rabbit	0	4 hours	14 days
	Skin - Erythema/Eschar	Rabbit	3	72 hours	14 days

Conclusion/Summary Not available.
Skin May be irritating to the skin.
Eyes Severe Irritant
Respiratory May be a respiratory irritant

Sensitizer

Product/ingredient name	Route of exposure	Species	Result
manganese sulphate	skin	Human	Not sensitizing

Conclusion/Summary Not available.
Skin Not considered a sensitizer
Respiratory Not considered a sensitizer

Carcinogenicity

Product/ingredient name	Result	Species	Dose	Exposure
None identified.				

Conclusion/Summary Not classified as carcinogenic, teratogenic and mutagenic

Mutagenicity

Product/ingredient name	Test	Experiment	Result
None identified.			

Conclusion/Summary Not classified as carcinogenic, teratogenic and mutagenic

Teratogenicity

Product/ingredient name	Result	Species	Dose	Exposure
None identified.				

Conclusion/Summary Not classified as carcinogenic, teratogenic and mutagenic

Reproductive toxicity

Product/ingredient name	Maternal toxicity	Fertility	Development toxin	Species	Dose	Exposure
None identified.						

Conclusion/Summary Not considered to be toxic to the reproductive system.

Mexico

Acute toxicity

11. Toxicological Information

Product/ingredient name	Result	Species	Dose	Exposure
citric acid	LD	Rat	382 mg/kg	-
	Intraperitoneal			
	LD Oral	Rat	8300 mg/kg	-
	LD50	Rat	290 mg/kg	-
	Intraperitoneal			
	LD50 Oral	Rat	3 g/kg	-
	LD50 Oral	Rat	11700 mg/kg	-
	LD50	Rat	5500 mg/kg	-
	Subcutaneous			
	manganese sulphate	LD50 Oral	Rat - Male, Female	2150 mg/kg
ammonia, anhydrous	TDL _o Oral	Rat	0.095 g/kg	-
	LC50 Inhalation Vapor	Rat	18600 mg/m ³	5 minutes
	LC50 Inhalation Vapor	Rat	7040 mg/m ³	30 minutes
	LC50 Inhalation Gas.	Rat	17401 ppm	15 minutes
	LC50 Inhalation Gas.	Rat	9500 ppm	1 hours
	LC50 Inhalation Gas.	Rat	2000 ppm	4 hours
	diiron tris(sulphate)	LD50 Oral	Rat - Male, Female	3200 mg/kg
	LD50 Oral	Rat - Male, Female	>2000 mg/kg	-

Conclusion/Summary May be toxic to humans and animals.

Irritation/Corrosion

Product/ingredient name	Result	Score	Score	Exposure	Observation
citric acid	Eyes - Severe irritant	Rabbit	-	24 hours 750 Micrograms	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Moderate irritant	Rabbit	-	0.5 Milliliters	-
manganese sulphate	Skin - Erythema/Eschar	Rabbit	0	4 hours	72 hours
	Skin - Edema	Rabbit	0	4 hours	72 hours
	Eyes - Cornea opacity	Rabbit	36	24 hours	-
diiron tris(sulphate)	Skin - Erythema/Eschar	Rabbit	0	4 hours	14 days
	Skin - Erythema/Eschar	Rabbit	3	72 hours	14 days

Conclusion/Summary Not available.

Skin May be irritating to the skin.

Eyes Severe Irritant

Respiratory May be a respiratory irritant

Sensitizer

Product/ingredient name	Route of exposure	Species	Result
manganese sulphate	skin	Human	Not sensitizing

Conclusion/Summary Not available.

11 . Toxicological Information

Skin	Not considered a sensitizer
Respiratory	Not considered a sensitizer
<u>Carcinogenicity</u>	
Conclusion/Summary	Not classified as carcinogenic, teratogenic and mutagenic
<u>Mutagenicity</u>	
Conclusion/Summary	Not classified as carcinogenic, teratogenic and mutagenic
<u>Teratogenicity</u>	
Conclusion/Summary	Not classified as carcinogenic, teratogenic and mutagenic
<u>Reproductive toxicity</u>	
Conclusion/Summary	Not considered to be toxic to the reproductive system.

12 . Ecological Information

Environmental effects No known significant effects or critical hazards.

United States

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
citric acid	-	Acute LC50 160000 ug/L Marine water	Crustaceans - Green or European shore crab - Carcinus maenas - Adult	48 hours
manganese sulphate	-	Acute LC50 130 mg/l Fresh water	Fish - Agosoa chrysogaster - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	-	Acute LC50 49.9 mg/l Fresh water	Fish - Salmo trutta	96 hours
	-	Acute LC50 5.1 mg/l Fresh water	Fish - Trout - Salvelinus fontinalis - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
ammonia, anhydrous	-	Acute LC50 0.88 mg/L Fresh water	Fish - Orangethroat darter - Etheostoma spectabile	96 hours
	-	Acute LC50 0.74 mg/L Fresh water	Fish - Orangethroat darter - Etheostoma spectabile	96 hours
	-	Acute LC50 1 to 1.5 ppm Fresh water	Fish - Fathead minnow - Pimephales promelas - Larvae - 90 days	96 hours

12 . Ecological Information

-	Acute LC50 0.53 ppm Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
-	Acute LC50 0.5 to 1 ppm Fresh water	Fish - Fathead minnow - Pimephales promelas - Larvae - 14 days	96 hours
-	Acute LC50 31260 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - 3.58 to 4.75 cm - 0.4 to 0.69 g	48 hours
-	Acute LC50 25400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
-	Acute LC50 22790 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Post-larvae	48 hours
-	Acute LC50 16010 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Mysis	48 hours
-	Acute LC50 14860 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoa	48 hours
-	Acute LC50 14530 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Zoa	48 hours
-	Acute LC50 11310 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Zoa	48 hours
-	Acute LC50 8590 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Post-larvae	48 hours
-	Acute LC50 5210 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoa	48 hours
-	Acute LC50 4980 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Nauplii	48 hours
-	Acute LC50 4180 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - <24 hours	48 hours
-	Acute LC50 4130 ug/L Fresh water	Daphnia - Water flea - Daphnia	48 hours

12 . Ecological Information

	-	Acute LC50 2710 ug/L Fresh water	pulex - <24 hours Daphnia - Water flea - Ceriodaphnia reticulata - <4 hours	48 hours
	-	Acute LC50 2500 ug/L Fresh water	Crustaceans - Aquatic sowbug - Asellus aquaticus - 8 to 10 mm	48 hours
	-	Acute LC50 660 ug/L Fresh water	Fish - common carp - Cyprinus carpio	96 hours
	-	Acute LC50 450 ug/L Fresh water	Fish - Chinook salmon - Oncorhynchus tshawytscha - Underyearling - 1 to 7 g	96 hours
	-	Acute LC50 440 ug/L Fresh water	Fish - common carp - Cyprinus carpio	96 hours
	-	Acute LC50 380 ug/L Fresh water	Fish - Silver carp - Hypophthalmichthys molitrix - Fingerling	96 hours
	-	Acute LC50 300 ug/L Fresh water	Fish - Carp - Hypophthalmichthys nobilis	96 hours
diiron tris(sulphate)	-	Acute LC50 54.77 mg/L Fresh water	Fish - Northern squawfish - Ptychocheilus oregonensis	96 hours
	-	Acute LC50 47 mg/L Fresh water	Fish - Brown trout - Salmo trutta - Fingerling - 30 g	4 days
	-	Acute LC50 28 mg/L Fresh water	Fish - Brown trout - Salmo trutta - Fingerling - 30 g	4 days
	-	Acute LC50 37200 ug/L Fresh water	Fish - Western mosquitofish - Gambusia affinis - Adult	96 hours
	-	Chronic LOAEL 10 mg/L Fresh water	Daphnia - Water flea - Daphnia longispina	48 hours
	-	Chronic NEL 8 mg/L Fresh water	Daphnia - Water flea - Daphnia longispina	48 hours

Conclusion/Summary

No known significant effects or critical hazards.

Canada

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
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12 . Ecological Information

citric acid	-	Acute LC50 160000 ug/L Marine water	Crustaceans - Green or European shore crab - <i>Carcinus maenas</i> - Adult	48 hours
manganese sulphate	-	Acute LC50 130 mg/l Fresh water	Fish - <i>Agosoa chrysogaster</i> - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	-	Acute LC50 49.9 mg/l Fresh water	Fish - <i>Salmo trutta</i>	96 hours
	-	Acute LC50 5.1 mg/l Fresh water	Fish - Trout - <i>Salvelinus fontinalis</i> - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
ammonia, anhydrous	-	Acute LC50 0.88 mg/L Fresh water	Fish - Orangethroat darter - <i>Etheostoma spectabile</i>	96 hours
	-	Acute LC50 0.74 mg/L Fresh water	Fish - Orangethroat darter - <i>Etheostoma spectabile</i>	96 hours
	-	Acute LC50 1 to 1.5 ppm Fresh water	Fish - Fathead minnow - <i>Pimephales promelas</i> - Larvae - 90 days	96 hours
	-	Acute LC50 0.53 ppm Fresh water	Daphnia - Water flea - <i>Daphnia magna</i>	48 hours
	-	Acute LC50 0.5 to 1 ppm Fresh water	Fish - Fathead minnow - <i>Pimephales promelas</i> - Larvae - 14 days	96 hours
	-	Acute LC50 31260 ug/L Marine water	Crustaceans - Redtail prawn - <i>Penaeus penicillatus</i> - 3.58 to 4.75 cm - 0.4 to 0.69 g	48 hours
	-	Acute LC50 25400 ug/L Fresh water	Daphnia - Water flea - <i>Daphnia magna</i>	48 hours
	-	Acute LC50 22790 ug/L Marine water	Crustaceans - Kuruma shrimp - <i>Penaeus japonicus</i> - Post- larvae	48 hours
	-	Acute LC50 16010 ug/L Marine water	Crustaceans - Kuruma shrimp - <i>Penaeus japonicus</i> - Mysis	48 hours

12 . Ecological Information

-	Acute LC50 14860 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoea	48 hours
-	Acute LC50 14530 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Zoea	48 hours
-	Acute LC50 11310 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Zoea	48 hours
-	Acute LC50 8590 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Post- larvae	48 hours
-	Acute LC50 5210 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoea	48 hours
-	Acute LC50 4980 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Nauplii	48 hours
-	Acute LC50 4180 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - <24 hours	48 hours
-	Acute LC50 4130 ug/L Fresh water	Daphnia - Water flea - Daphnia pulex - <24 hours	48 hours
-	Acute LC50 2710 ug/L Fresh water	Daphnia - Water flea - Ceriodaphnia reticulata - <4 hours	48 hours
-	Acute LC50 2500 ug/L Fresh water	Crustaceans - Aquatic sowbug - Asellus aquaticus - 8 to 10 mm	48 hours
-	Acute LC50 660 ug/L Fresh water	Fish - common carp - Cyprinus carpio	96 hours
-	Acute LC50 450 ug/L Fresh water	Fish - Chinook salmon - Oncorhynchus tshawytscha - Underyearling - 1 to 7 g	96 hours
-	Acute LC50 440 ug/L Fresh water	Fish - common carp - Cyprinus carpio	96 hours
-	Acute LC50 380 ug/L Fresh water	Fish - Silver carp - Hypophthalmichthys	96 hours

12 . Ecological Information

	-	Acute LC50 300 ug/L Fresh water	molitrix - Fingerling Fish - Carp - Hypophthalmichthys nobilis	96 hours
diiron tris(sulphate)	-	Acute LC50 54.77 mg/L Fresh water	Fish - Northern squawfish - Ptychocheilus oregonensis	96 hours
	-	Acute LC50 47 mg/L Fresh water	Fish - Brown trout - Salmo trutta - Fingerling - 30 g	4 days
	-	Acute LC50 28 mg/L Fresh water	Fish - Brown trout - Salmo trutta - Fingerling - 30 g	4 days
	-	Acute LC50 37200 ug/L Fresh water	Fish - Western mosquitofish - Gambusia affinis - Adult	96 hours
	-	Chronic LOAEL 10 mg/L Fresh water	Daphnia - Water flea - Daphnia longispina	48 hours
	-	Chronic NEL 8 mg/L Fresh water	Daphnia - Water flea - Daphnia longispina	48 hours

Conclusion/Summary No known significant effects or critical hazards.

Mexico

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
citric acid	-	Acute LC50 160000 ug/L Marine water	Crustaceans - Green or European shore crab - Carcinus maenas - Adult	48 hours
manganese sulphate	-	Acute LC50 130 mg/l Fresh water	Fish - Agosoa chrysogaster - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
	-	Acute LC50 49.9 mg/l Fresh water	Fish - Salmo trutta	96 hours
	-	Acute LC50 5.1 mg/l Fresh water	Fish - Trout - Salvelinus fontinalis - Juvenile (Fledgling, Hatchling, Weanling)	96 hours
ammonia, anhydrous	-	Acute LC50 0.88 mg/L Fresh water	Fish - Orangethroat darter - Etheostoma spectabile	96 hours
	-	Acute LC50 0.74	Fish -	96 hours

12 . Ecological Information

	mg/L Fresh water	Orangethroat darter - Etheostoma spectabile	
-	Acute LC50 1 to 1.5 ppm Fresh water	Fish - Fathead minnow - Pimephales promelas - Larvae - 90 days	96 hours
-	Acute LC50 0.53 ppm Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
-	Acute LC50 0.5 to 1 ppm Fresh water	Fish - Fathead minnow - Pimephales promelas - Larvae - 14 days	96 hours
-	Acute LC50 31260 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - 3.58 to 4.75 cm - 0.4 to 0.69 g	48 hours
-	Acute LC50 25400 ug/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
-	Acute LC50 22790 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Post-larvae	48 hours
-	Acute LC50 16010 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Mysis	48 hours
-	Acute LC50 14860 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoea	48 hours
-	Acute LC50 14530 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Zoea	48 hours
-	Acute LC50 11310 ug/L Marine water	Crustaceans - Kuruma shrimp - Penaeus japonicus - Zoea	48 hours
-	Acute LC50 8590 ug/L Marine water	Crustaceans - San paulo shrimp - Penaeus paulensis - Post-larvae	48 hours
-	Acute LC50 5210 ug/L Marine water	Crustaceans - Redtail prawn - Penaeus penicillatus - Zoea	48 hours
-	Acute LC50 4980 ug/L Marine	Crustaceans - Kuruma shrimp -	48 hours

12 . Ecological Information

	water	Penaeus japonicus - Nauplii	
-	Acute LC50 4180 ug/L Fresh water	Daphnia - Water flea - Daphnia magna - <24 hours	48 hours
-	Acute LC50 4130 ug/L Fresh water	Daphnia - Water flea - Daphnia pulex - <24 hours	48 hours
-	Acute LC50 2710 ug/L Fresh water	Daphnia - Water flea - Ceriodaphnia reticulata - <4 hours	48 hours
-	Acute LC50 2500 ug/L Fresh water	Crustaceans - Aquatic sowbug - Asellus aquaticus - 8 to 10 mm	48 hours
-	Acute LC50 660 ug/L Fresh water	Fish - common carp - Cyprinus carpio	96 hours
-	Acute LC50 450 ug/L Fresh water	Fish - Chinook salmon - Oncorhynchus tshawytscha - Underyearling - 1 to 7 g	96 hours
-	Acute LC50 440 ug/L Fresh water	Fish - common carp - Cyprinus carpio	96 hours
-	Acute LC50 380 ug/L Fresh water	Fish - Silver carp - Hypophthalmichthys molitrix - Fingerling	96 hours
-	Acute LC50 300 ug/L Fresh water	Fish - Carp - Hypophthalmichthys nobilis	96 hours
diiron tris(sulphate)	Acute LC50 54.77 mg/L Fresh water	Fish - Northern squawfish - Ptychocheilus oregonensis	96 hours
-	Acute LC50 47 mg/L Fresh water	Fish - Brown trout - Salmo trutta - Fingerling - 30 g	4 days
-	Acute LC50 28 mg/L Fresh water	Fish - Brown trout - Salmo trutta - Fingerling - 30 g	4 days
-	Acute LC50 37200 ug/L Fresh water	Fish - Western mosquitofish - Gambusia affinis - Adult	96 hours
-	Chronic LOAEL 10 mg/L Fresh water	Daphnia - Water flea - Daphnia longispina	48 hours
-	Chronic NEL 8 mg/L Fresh water	Daphnia - Water flea - Daphnia longispina	48 hours

12 . Ecological Information

Conclusion/Summary No known significant effects or critical hazards.



13 . Disposal Considerations

Waste disposal The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport Information

Regulatory information	UN number	Shipping name	Classes	PG*	Label	Additional information
DOT Classification	Not regulated.	-	-	-		-
TDG Classification	Not regulated.	-	-	-		-
Mexico Classification	Not available.	Not available.	Not available.	-		-

PG* : Packing group

15 . Regulatory Information

United States

HCS Classification Irritating material
Target organ effects

U.S. Federal regulations TSCA 8(a) IUR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.

15 . Regulatory Information

SARA 302/304/311/312 extremely hazardous substances: ammonia, anhydrous
SARA 302/304 emergency planning and notification: ammonia, anhydrous
SARA 302/304/311/312 hazardous chemicals: citric acid; manganese sulphate; ammonia, anhydrous; diiron tris(sulphate)
SARA 311/312 MSDS distribution - chemical inventory - hazard identification:
 citric acid: Immediate (acute) health hazard; manganese sulphate: Delayed (chronic) health hazard; ammonia, anhydrous: Sudden release of pressure, Immediate (acute) health hazard; diiron tris(sulphate): Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 311: ammonia, anhydrous; diiron tris(sulphate)

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: ammonia, anhydrous

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

Listed

Clean Air Act Section 602 Class I Substances

Not listed

Clean Air Act Section 602 Class II Substances

Not listed

DEA List I Chemicals (Precursor Chemicals)

Not listed

DEA List II Chemicals (Essential Chemicals)

Not listed

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Form R - Reporting requirements	manganese sulphate	7785-87-7	10 - 20
	ammonia, anhydrous	7664-41-7	5 - 10
Supplier notification	manganese sulphate	7785-87-7	10 - 20
	ammonia, anhydrous	7664-41-7	5 - 10

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

Connecticut Carcinogen Reporting: None of the components are listed.
Connecticut Hazardous Material Survey: None of the components are listed.
Florida substances: None of the components are listed.
Illinois Chemical Safety Act: None of the components are listed.
Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.
Louisiana Reporting: None of the components are listed.
Louisiana Spill: None of the components are listed.
Massachusetts Spill: None of the components are listed.
Massachusetts Substances: The following components are listed: AMMONIA; FERRIC SULFATE
Michigan Critical Material: None of the components are listed.
Minnesota Hazardous Substances: None of the components are listed.
New Jersey Hazardous Substances: The following components are listed: MANGANESE compounds, n.o.s.; AMMONIA; FERRIC SULFATE; SULFURIC ACID, IRON(3+) SALT (3:2)
New Jersey Spill: None of the components are listed.
New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.
New York Acutely Hazardous Substances: The following components are listed: Ammonia; Ferric sulfate

15 . Regulatory Information

New York Toxic Chemical Release Reporting: None of the components are listed.
Pennsylvania RTK Hazardous Substances: The following components are listed:
 MANGANESE COMPOUNDS; AMMONIA; SULFURIC ACID, IRON(3+) SALT (3:2)
Rhode Island Hazardous Substances: None of the components are listed.

United States inventory (TSCA 8b) All components are listed or exempted.

Canada

WHMIS (Canada) Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
 Class D-2B: Material causing other toxic effects (Toxic).
 Class E: Corrosive material

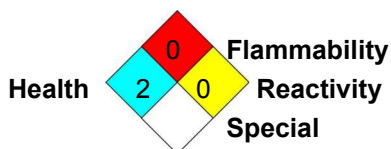
Canadian lists **CEPA Toxic substances:** None of the components are listed.
Canadian ARET: None of the components are listed.
Canadian NPRI: The following components are listed: Manganese; Ammonia (total)
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

Canada inventory All components are listed or exempted.

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

Mexico

Classification



EU regulations

Hazard symbol or symbols



Risk phrases R20- Harmful by inhalation.
 R48/20/22- Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
 R36/38- Irritating to eyes and skin.
 R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases S2- Keep out of the reach of children.
 S46- If swallowed, seek medical advice immediately and show this container or label.

International regulations

International lists **Australia inventory (AICS):** All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.

15 . Regulatory Information

Chemical Weapons Convention List
Schedule I Chemicals
Not listed

Chemical Weapons Convention List
Schedule II Chemicals
Not listed

Chemical Weapons Convention List
Schedule III Chemicals
Not listed

16 . Other information

Label requirements CAUSES EYE AND SKIN IRRITATION. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

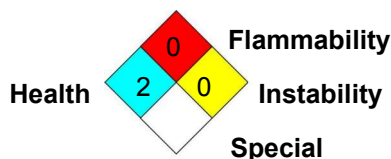
Hazardous Material Information System (U.S.A.)

Health	2
Flammability	0
Physical hazards	0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material. Suggested protective clothing might not be adequate. Consult a specialist before handling this product.

National Fire Protection Association (U.S.A.)



Date of issue 3/8/2012.

Version 1

Indicates information that has changed from previously issued version.

Notice to Reader:

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