Safety Data Sheet

Section 1: Identification

Product identifier	
Product Name ·	Cupric Sulfate Solution or Copper Sulfate Solution
Relevant identified uses of	the substance or mixture and uses advised against
Recommended use •	Flotation of concentrates and other uses
Details of the supplier of th	e safety data sheet
Manufacturer •	Nyrstar Clarksville Inc.
	Zinc Plant Rd PO Box 1104 Clarksville, TN 37041-1104 United States
Telephone (General) •	(931) 552-4200
Emergency telephone num	iber
Manufacturer •	(931) 552-4200 - Technical Service
Manufacturer •	(931) 552-4200 - Technical Service

Section 2: Hazard Identification

United States (US) According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012	 Corrosive to Metals 1 Acute Toxicity Oral 4 Skin Irritation 2 Eye Irritation 2 Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation Carcinogenicity 1A Specific Target Organ Toxicity Repeated Exposure 1 Hazardous to the aquatic environment Acute 1 Hazardous to the aquatic environment Charging 1
	Hazardous to the aquatic environment Chronic 1

Label elements **OSHA HCS 2012**

DANGER



Hazard statements . May be corrosive to metals Harmful if swallowed Causes skin irritation Causes serious eye irritation May cause respiratory irritation May cause cancer. Causes damage to organs through prolonged or repeated exposure.

	Very toxic to aquatic life Very toxic to aquatic life with long lasting effects
Precautionary statements	
	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep only in original container. Do not breathe mists, vapours, and/or spray. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
Response •	Absorb spillage to prevent material damage. IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell. If on skin: Wash with plenty of water . Take off contaminated clothing and wash before reuse. Specific treatment, see supplemental first aid information. If skin irritation occurs: Get medical advice/attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention. IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. IF exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell.
Storage/Disposal •	Store in corrosive resistant/ container with a resistant inner liner. Store in a well-ventilated place. Keep container tightly closed. Store locked up. Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.
Supplemental information •	<2 percent of this product consists of an ingredient of unknown toxicity.
Other hazards	
OSHA HCS 2012 •	Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Section 3 - Composition/Information on Ingredients

Substances

• Material does not meet the criteria of a substance.

Mixtures

Composition					
Chemical Name	Identifiers	%	% LD50/LC50 Classifications According to Regulation/Directive		Comments
Copper(II) sulfate, pentahydrate (1:1:5)	CAS :7758- 99-8	18% TO 30%	Ingestion/Oral-Rat LD50 • 300 mg/kg OSHA HCS 2012: Acute Tox. 3 (Orl); STOT RE 1 (Liver); Skin Irrit. 2; Eye Irrit. 2; STOT SE 3: Resp. Irrit.;		NDA
Zinc sulfate (1:1)	CAS :7733- 02-0	< 2%	NDA	A OSHA HCS 2012: Eye Irrit. 2	
			Inhalation-Rat LC50 •		

Sulfuric acid	CAS :7664- 93-9	< 1%	510 mg/m ³ 2 Hour(s) Ingestion/Oral-Rat LD50 • 2140 mg/kg	OSHA HCS 2012: Eye Dam. 1, Skin Corr. 1B	NDA
Cadmium sulfate (1:1) CAS:10124- 36-4		< 1%	Ingestion/Oral-Rat LD50 • 280 mg/kg	OSHA HCS 2012: Carc. 1A; Acute Tox. 3 (Orl); STOT RE 1 (Kidney, Bones, Lungs)	NDA

Section 4: First-Aid Measures

Description of first aid measures

Inhalation	 Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.
Skin	 In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Take off contaminated clothing and wash before reuse. If irritation develops and persists, get medical attention.
Eye	 In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.
Ingestion	 Do not use mouth-to-mouth method if victim ingested the substance. Obtain medical attention immediately if ingested.
Most important sy	mptoms and effects, both acute and delayed
	 Refer to Section 11 - Toxicological Information.
Indication of any ir	nmediate medical attention and special treatment needed
Notes to Physician	 All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5: Fire-Fighting Measures

Extinguishing mediaSuitable Extinguishing MediaLARGE FIRES: Dry chemical, CO2, alcohol-resistant foam or water spray.
SMALL FIRES: Dry chemical, CO2 or water spray.Unsuitable Extinguishing
MediaNo data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards	 Containers may explode when heated. May be corrosive to metals. If heated above 600°C SO2 is evolved. If water is used it will solubilize CuSO4. Contact with magnesium may evolve hydrogen gas. Anhydrous salt will ignite hydroxylamine if present. It is incompatible with hydroxylamine, magnesium and acetylene. In solutions where sulfuric acid is present: Will liberate hydrogen when reacting with metals. In solutions where zinc and/or cadmium is present: Emits toxic fumes under fire conditions.
Hazardous Combustion Products	Oxides of sulfur and copper.
Advice for firefighters	
	 Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible. Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.

Wear positive pressure self-contained breathing apparatus (SCBA). SMALL FIRES: Move containers from fire area if you can do it without risk.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions	 Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
Emergency Procedures	• ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Keep unauthorized personnel away. Stay upwind. Keep out of low areas. Do not get water inside container.
Environmental precautio	ns

· Avoid run off to waterways and sewers.

Methods and material for containment and cleaning up

Containment/Clean-up Measures	 Confine spill and introduce lime or soda ash to form insoluble copper salt. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
	Dike to collect large liquid spills.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

 Handle and open container with care. Use only with adequate ventilation. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe mist, vapours and/or spray. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Containers of this material may be hazardous when empty since they retain product residues. Empty and clean containers of all residues before disposal.

Conditions for safe storage, including any incompatibilities

Storage

• Keep container/package tightly closed in a cool, well-ventilated place. Protect containers against physical damage and moisture. Store in Plastic, rubber, 304, 347, or 316 stainless steels.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines						
	Result	ACGIH	NIOSH	OSHA		
Sulfuric acid (7664-93-9)	TWAs	0.2 mg/m3 TWA (thoracic fraction)	1 mg/m3 TWA	1 mg/m3 TWA		
Copper(II) sulfate, pentahydrate (1:1:5)	TWAs		1 mg/m3 TWA (dust and mist, as Cu) as Copper compounds	Not established		

Exposure controls

Engineering Measures/Controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal Protective Equipment

Respiratory	 In case of insufficient ventilation, wear suitable respiratory equipment. Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or symptoms are experienced.
Eye/Face	Wear safety goggles.
Skin/Body	 Wear appropriate gloves. Wear long sleeves and/or protective coveralls.
Environmental Exposure Controls	 Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways. Follow best practice for site management and disposal of waste.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene

NIOSH = National Institute of Occupational Safety and Health

OSHA = Occupational Safety and Health Administration

TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Liquid	Appearance/Description	Clear blue liquid.
Color	Clear blue.	Odor	No data available
Odor Threshold	No data available		
General Properties			
Boiling Point	> 100 °C(> 212 °F)	Melting Point/Freezing Point	< 0 °C(< 32 °F)
Decomposition Temperature	No data available	рН	1
Specific Gravity/Relative Density	1.2 to 1.3 @ 4 °C(39.2 °F) Water=1	Water Solubility	100 %
Viscosity	No data available		
Volatility			
Vapor Pressure	No data available	Vapor Density	No data available
Evaporation Rate	No data available		
Flammability		-	
Flash Point	No data available	UEL	No data available
LEL	No data available	Autoignition	No data available
Flammability (solid, gas)	No data available		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

• No dangerous reaction known under conditions of normal use.

Chemical stability

Stable

Possibility of hazardous reactions

• Hazardous polymerization will not occur.

Conditions to avoid

• Incompatible materials. Excess heat.

Incompatible materials

 Corrosive to mild steel. Avoid alkaline materials. Anhydrous salt will ignite hydroxylamine if present. It is incompatible with hydroxylamine, magnesium and acetylene. In solutions where sulfuric acid is present: Organics, chlorates, carbides, nitrates, picrates, powdered metals, fulmates and combustible materials. Is corrosive to mild steel.

Hazardous decomposition products

 Above 600 C sulfur dioxide is evolved. High temperature operations such as oxyacetylene cutting, electric arc welding on dried residues of this material may generate toxic copper fumes and sulfur dioxide. The fumes will contain copper oxides, which, on inhalation of sufficient quantity, can produce metal fume fever. In solutions where sulfuric acid is present: Thermal decomposition may release toxic oxides of sulfur. In solutions where zinc is present: Zinc/zinc oxides, sulfur oxides, hydrogen sulfide gas is released. In solutions where cadmium is present: Highly toxic fumes of cadmium and cadmium oxides.

Section 11 - Toxicological Information

Information on toxicological effects

	Components			
Copper(II) sulfate, pentahydrate (1:1:5) (18% TO 30%)	involtate (1:1:5) // 158- gg_8 changes; <i>Kidney, Ureter, and Bladder</i> :Other changes; <i>Blood</i> :Other hemolysis with or without			
Zinc sulfate (1:1) (< 2%)	7733- 02-0	tion: Eye-Rabbit • 420 μg • Moderate irritation		
Cadmium sulfate (1:1) (< 1%)	10124- 36-4	Acute Toxicity: Ingestion/Oral-Rat LD50 • 280 mg/kg; Multi-dose Toxicity: Ingestion/Oral-Rat TDLo • 315 mg/kg 3 Week(s)-Intermittent; <i>Reproductive</i> <i>Effects:Paternal Effects:</i> Spermatogenesis; <i>Reproductive Effects:Paternal Effects:</i> Testes, epididymis, sperm duct; <i>Related to Chronic Data:</i> Changes in testicular weight; Mutagen: DNA damage • Ingestion/Oral-Rat • 140 mg/kg; Reproductive: Ingestion/Oral-Rat TDLo • 35230 mg/kg (1-19D preg); <i>Reproductive Effects:Effects on</i> <i>Fertility:</i> Pre-implantation mortality; <i>Reproductive Effects:Effects on Fertility:</i> Post-implantation mortality; <i>Reproductive Effects:Effects on Embryo or Fetus:</i> Maternal-fetal exchange		
Sulfuric acid (< 1%)	7664- 93-9	Acute Toxicity: Ingestion/Oral-Rat LD50 • 2140 mg/kg; Inhalation-Rat LC50 • 510 mg/m ³ 2 Hour(s); Irritation: Eye-Rabbit • 250 μg • Severe irritation; Reproductive: Inhalation-Rabbit TCLo • 20 mg/m ³ 7 Hour(s)(6-18D preg); <i>Reproductive Effects:Specific Developmental Abnormalities</i> :Musculoskeletal system		

GHS Properties	Classification
Acute toxicity	OSHA HCS 2012 • Acute Toxicity - Oral 4 - ATEmix (oral) = 1000 mg/kg
Skin corrosion/Irritation	OSHA HCS 2012 • Skin Irritation 2
Serious eye damage/Irritation	OSHA HCS 2012 • Eye Irritation 2
Skin sensitization	OSHA HCS 2012 • No data available
Respiratory sensitization	OSHA HCS 2012 • No data available
Aspiration Hazard	OSHA HCS 2012 • No data available
Carcinogenicity	OSHA HCS 2012 • Carcinogenicity 1A
Germ Cell Mutagenicity	OSHA HCS 2012 • No data available
Toxicity for Reproduction	OSHA HCS 2012 • No data available

STOT-SE	OSHA HCS 2012 • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
STOT-RE	OSHA HCS 2012 • Specific Target Organ Toxicity Repeated Exposure 1
Potential Health Effects	
Inhalation	
Acute (Immediate)	May cause respiratory irritation.
Chronic (Delayed)	No data available
Skin	
Acute (Immediate)	Causes skin irritation.
Chronic (Delayed)	No data available
Eye	
Acute (Immediate)	Causes serious eye irritation.
Chronic (Delayed)	No data available
Ingestion	
Acute (Immediate)	Harmful if swallowed.
Chronic (Delayed)	• Copper(II) sulfate, pentahydrate (1:1:5) may have effects on the liver when ingested.
Carcinogenic Effects	 Repeated and prolonged exposure may cause cancer.

	CAS	IARC			
Cadmium sulfate (1:1)	10124-36-4	Group 1-Carcinogenic			
Sulfuric acid	7664-93-9	Group 1-Carcinogenic			

Key to abbreviations

LC = Lethal Concentration

LD = Lethal Dose

TC = Toxic Concentration

TD = Toxic Dose

Section 12 - Ecological Information

Toxicity

• Cupric sulfate is an ecotoxin, a severe marine pollutant.

Persistence and degradability

• Material data lacking.

Bioaccumulative potential

• Ma

Mobility in Soil

Material data lacking.

Material data lacking.

Other adverse effects

• No studies have been found.

Section 13 - Disposal Considerations

Waste treatment methods

Ρ	ro	du	ct	wast	е
		uu	υı	wast	

• Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste

• Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	UN1760	Corrosive Liquid N.O.S.	8		Marine Pollutant

Special precautions for user • None specified.

Transport in bulk according	•	No data available
to Annex II of MARPOL 73/78		
and the IBC Code		

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications • Acute, Chronic

Inventory						
Component	CAS	Canada DSL	Canada NDSL	EU EINECS	EU ELNICS	TSCA
Cadmium sulfate (1:1)	10124-36-4	Yes	No	Yes	No	Yes
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	No	No	No	No	No
Sulfuric acid	7664-93-9	Yes	No	Yes	No	Yes
Zinc sulfate (1:1)	7733-02-0	Yes	No	Yes	No	Yes

Canada

 Copper(II) sulfate, pentahydrate (1:1:5) 	7758-99-8	D2B
Cadmium sulfate (1:1)	10124-36-4	D1A, D2A
• Zinc sulfate (1:1)	7733-02-0	Uncontrolled product according to WHMIS classification criteria
Sulfuric acid	7664-93-9	D1A, E (including 50% (14.2N), >51%, 85% (30.8)); E (2% (0.4N), 4.9% (1N))
Canada - WHMIS - Ingredient Disclosure List		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	0.1 %
Zinc sulfate (1:1)	7733-02-0	1 %
Sulfuric acid	7664-93-9	1 %

Environment

Canada - CEPA - Priority Substances List	
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8

Not Listed

Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed

United States

Labor		
U.S OSHA - Process Safety Management - Highly Hazardous Chemicals		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S OSHA - Specifically Regulated Chemicals		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
• Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
Environment		
U.S CAA (Clean Air Act) - 1990 Hazardous Air Pollutants		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
• Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S CERCLA/SARA - Hazardous Substances and their Reportable Quantities		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
• Zinc sulfate (1:1)	7733-02-0	1000 lb final RQ; 454 kg final RQ
• Sulfuric acid	7664-93-9	1000 lb final RQ; 454 kg final RQ
U.S CERCLA/SARA - Radionuclides and Their Reportable Quantities		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
• Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	1000 lb EPCRA RQ
U.S CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	1000 lb TPQ
U.S CERCLA/SARA - Section 313 - Emission Reporting		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed

• Sulfuric acid	7664-93-9	1.0 % de minimis concentration (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size)
U.S CERCLA/SARA - Section 313 - PBT Chemical Listing		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed

United States - California

Environment U.S California - Proposition 65 - Carcinogens List		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S California - Proposition 65 - Developmental Toxicity		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S California - Proposition 65 - Maximum Allowable Dose Levels (MADL)		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S California - Proposition 65 - No Significant Risk Levels (NSRL)		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S California - Proposition 65 - Reproductive Toxicity - Female		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed
U.S California - Proposition 65 - Reproductive Toxicity - Male		
Copper(II) sulfate, pentahydrate (1:1:5)	7758-99-8	Not Listed
Cadmium sulfate (1:1)	10124-36-4	Not Listed
Zinc sulfate (1:1)	7733-02-0	Not Listed
Sulfuric acid	7664-93-9	Not Listed

Section 16 - Other Information

Revision Date

• 25/September/2017

Preparation Date

Disclaimer/Statement of Liability

Key to abbreviations

NDA = No Data Available

- 10/August/2012
- This safety data sheet is offered solely for your information, consideration and investigation. It provides no warranties, either expressed or implied, and assumes no responsibility for the accuracy or completeness of the data contained herein.