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Material Safety Data Sheet QSI-Nano® Copper Powder

1. Product and Company Identification

PRODUCT NAME: QSI-Nano® Copper Powder / Copper Oxide Powder
SYNONYMS: Cu/ CuO

MANUFACTURER: QuantumSphere, Inc.
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Santa Ana, CA 92705

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2. Composition/Information on Ingredients

<u>Ingredient</u>	<u>CAS No</u>	<u>Percent</u>	<u>Hazardous</u>
Copper	7440-50-8	30-90%	Yes
Copper(II) Oxide	1317-38-0	balance	Yes

CHEMICAL NAME: Copper / Copper Oxide
CHEMICAL FAMILY: Metal / Metal Oxide Powder
CHEMICAL FORMULA: Cu / CuO

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER AND KIDNEYS. CHRONIC EXPOSURE MAY CAUSE TISSUE DAMAGE.

Safety Data

HMIS Ratings: Health=1, Flammability=0, Reactivity=0, Contact=1

Lab Protective Equip: Goggles, lab coat

Storage Color Code: Orange (general storage)

Potential Health Effects

Inhalation: Inhalation of dusts and fumes of metallic copper causes irritation of the upper respiratory tract, congestion of nasal mucous membranes, ulceration and perforation of the nasal septum and pharyngeal congestion. Inhalation of copper fumes may give rise to metal fume fever (high temperature, metallic taste, nausea, coughing, general weakness, muscle aches and exhaustion).

Ingestion: Copper ingestion causes nausea, vomiting, abdominal pain, metallic taste and diarrhea. Ingestion of large doses may cause stomach and intestine ulceration, jaundice and kidney and liver damage.

Skin Contact: Causes irritation to skin. Symptoms include redness, itching, and pain. Exposure to

copper dust may cause a greenish-black skin discoloration.

Eye Contact: Small copper particles in the eyes may cause irritation, discoloration and damage.

Chronic Exposure: Prolonged or repeated exposure to copper can discolor skin and hair and irritate the skin; may cause mild dermatitis, runny nose and irritation of the mucous membranes. Repeated ingestion may damage the liver and kidneys. Repeated inhalation can cause chronic respiratory disease.

Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or impaired liver, kidney or pulmonary function or pre-existing Wilson's disease may be more susceptible to the effects of this material.

4. First Aid Measures

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention.

Ingestion: Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Skin Contact: Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Seek medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact: Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Seek medical attention immediately.

5. Fire Fighting Measures

Fire: Any very finely divided particles (ultra-fine powder) may burn in air when exposed to heat or flame.

Pyrophoric/Autoignition: No

Explosion: This material, like most materials in powder form, is capable of creating a dust explosion. Reactions with incompatibles may pose an explosion hazard. Liquid copper explodes on contact with water. Sensitive to static discharge.

Fire Extinguishing Media: Sand or dry powder type specially designed for metal powder fires. Do not use water.

Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

NFPA Ratings: Health: 2, Flammability: 0, Reactivity: 0

6. Accidental Release Measures

In case of a leak or spill, evacuate area, shut off all sources of ignition and use nonsparking tools. Wear self-contained breathing apparatus, boots, and protective gloves. Wear disposable coveralls and discard after use. Sweep up the spill, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pick-up is complete.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect from physical damage, ignition sources and electrostatic discharges. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls, Personal Protection

Airborne Exposure Limits:

Copper dust and mists:

- OSHA Permissible Exposure Limit (PEL) 1 mg/m³ (TWA)
- ACGIH Threshold Limit Value (TLV) 1 mg/m³ (TWA)
- NIOSH Recommended Exposure Limit (REL) 1 mg/m³ (TWA)

Copper Fume:

- OSHA Permissible Exposure Limit (PEL) 0.1 mg/m³
- ACGIH Threshold Limit Value (TLV) 0.2 mg/m³ (TWA)

Ventilation System: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emission of the contaminant at its source, preventing dispersion of it into the general work area.

Respiratory Protection Equipment:

Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures. Currently, there are no specific exposure limits for airborne exposures to engineered nanoparticles although occupational exposure limits exist for larger particles of similar chemical composition. The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure. Preliminary evidence shows that for respiration filtration media there is no deviation from the classical single-fiber theory for particulates as small as 2.5 nm in diameter. While this evidence needs confirmation, NIOSH certified respirators will be useful for protecting workers from nanoparticles inhalation when properly selected and fit tested as part of a complete respiratory protection program.

Use NIOSH approved positive flow mask if dust becomes airborne. Try to avoid creating dust conditions.

Skin Protection: Wear impervious protective clothing including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Wash thoroughly after handling. Maintain quick-drench facilities in work area.

Eye Protection: Use chemical safety goggles and/or full face shield where dusting or splashing of solution is possible. Maintain eye wash fountain in work area.

9. Physical and Chemical Properties

Appearance:	Black powder with an average particle size of 10 - 70 nanometers.
Odor:	Odorless
Solubility:	Insoluble in water
Density:	8.94 g/cm ³
Molecular Weight:	63.546 AMU
pH:	Not available
Boiling Point:	2595C (4703F)
Melting Point:	1083C (1981F)
Vapor Pressure (mm Hg):	1 at 1628C (2962F)
Evaporation Rate:	Not available

10. Stability and Reactivity

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: Not available.

Hazardous Polymerization: Will not occur.

Incompatibilities: Copper is incompatible with oxidizers, alkalis, acetylene, chlorine plus oxygen

difluoride, phosphorus, nitric acid, potassium peroxide, 1-bromo-2-propyne, sulfur plus chlorates. Reacts violently with ammonium nitrate, bromates, iodates, chlorates, ethylene oxide, hydrozoic acid, potassium oxide, dimethyl sulfoxide plus trichloroacetic acid, hydrogen peroxide, sodium azide, sulfuric acid, hydrogen sulfide plus air and lead azide. A potentially explosive reaction occurs with acetylenic compounds. Copper ignites on contact with chlorine, fluorine (above 121C), chlorine trifluoride, and hydrazinum nitrate (above 70C). An incandescent reaction occurs with potassium dioxide.

Conditions to Avoid: Incompatibles and prolonged exposure to air and moisture.

11. Toxicological Information

NTP Known Carcinogen: No
NTP Anticipated Carcinogen: No
IARC Category: None

12. Ecological Information

Environmental Fate: No information found.
Environmental Toxicity: No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and Local disposal regulations may differ from Federal disposal regulations. Dispose of container and unused contents in accordance with Federal, State and Local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

Chemical Inventory Status – Part 1-

Ingredient	TSCA	EC	Japan	Australia
Copper (7440-50-8)	Yes	Yes	No	Yes

Chemical Inventory Status – Part 2-

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Copper (7440-50-8)	Yes	Yes	No	Yes

Federal, State & International Regulations – Part 1-

--SARA 302-- -----SARA 313-----



Ingredient	RQ	TPQ	List	Chemical Catg.
Copper (7440-50-8)	No	No	Yes	No

Federal, State & International Regulations – Part 2 -

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8 (d)
Copper (7440-50-8)	5000	No	No

Chemical Weapons Convention: No

TSCA 12(b): No

CDTA: No

SARA 311/312: Acute: Yes, Chronic: Yes, Fire: No, Pressure: No, Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS: This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

Label Hazard Warning: WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER AND KIDNEYS. CHRONIC EXPOSURE MAY CAUSE TISSUE DAMAGE.

Label First Aid: If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, seek medical attention.

Product Use: Laboratory reagent.

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