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## Material Safety Data Sheet

# QSI-Nano<sup>®</sup> Nickel/Nickel Oxide Powder

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### 1. Product and Company Identification

PRODUCT NAME: QSI-Nano<sup>®</sup> Nickel / Nickel Oxide Powder  
SYNONYMS: Ni / NiO

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>
Nickel	7440-02-0	30-90%	Yes
Nickel(II) oxide	1313-99-1	balance	Yes

CHEMICAL NAME: Nickel / Nickel Oxide  
CHEMICAL FAMILY: Metal / Metal Oxide Powder  
CHEMICAL FORMULA: Ni / NiO

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### 3. Hazards Identification

#### Emergency Overview

Harmful. Flammable (USA) Highly Flammable (EU).  
Possible Carcinogen (USA) Calif. Prop 65 Carcinogen  
Limited evidence of a carcinogenic effect. May cause sensitization by skin contact.  
Target organ(s): Nasal cavities, lungs, skin.

#### Safety Data

**HMIS Ratings:** Health=3, Flammability=2, Reactivity=1  
**Lab Protective Equip:** Goggles; Lab coat

**Potential Health Effects**

**Inhalation:** May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract. May cause asthmatic attacks due to allergic sensitization of the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause loss of smell.

**Ingestion:** May be harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May cause tremors and convulsions. Ingestion of large amounts may cause gastroenteritis.

**Skin Contact:** May cause skin irritation and possible burns. Causes “nickel itch” which is a dermatitis resulting from sensitization to nickel, which is characterized by skin eruptions, followed by discrete ulcers that may discharge and become crusted, or by eczema. May cause sensitization by skin contact.

**Eye Contact:** May cause eye irritation. Causes redness and pain. May cause chemical conjunctivitis and corneal damage.

**Chronic Exposure:** This product contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP or EPA classification.

**Aggravation of Pre-existing Conditions:** Skin contact can cause an allergic skin rash in previously sensitized individuals.

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**4. First Aid Measures**

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek medical attention if cough or other symptoms appear.

**Ingestion:** Do not induce vomiting. Wash out mouth with water and give 2-4 cups of milk or water. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

**Skin Contact:** Flush with copious amounts of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Seek medical attention if irritation develops or persists. Wash clothing before reuse. Thoroughly clean shoes before reuse.

**Eye Contact:** Flush with copious amounts of water for at least 15 minutes, occasionally lifting lower and upper eyelids. Seek medical attention immediately.

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**5. Fire Fighting Measures**

**Fire:** Flammable hazard. 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.

**Fire Extinguishing Media:** Dry chemical powder or sand – do not use water, carbon dioxide or foam. Dousing metallic fires with water may generate hydrogen gas, an extremely dangerous explosion hazard, particularly if fire is in a confined environment.

**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.

**Specific Hazard(s):** Emits toxic fumes under fire conditions.

**NFPA Ratings:** Health: 3, Flammability: 2, Reactivity: 1

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**6. Accidental Release Measures**

In case of a leak or spill, evacuate area, shut off all sources of ignition and use nonsparking tools. Wear NIOSH approved respirator, rubber boots, and heavy rubber 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.

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## 7. Handling and Storage

Do not inhale powder. Avoid contact with eyes, skin and clothing. Avoid prolonged or repeated exposure. Wash thoroughly after handling. Keep in a tightly closed container, away from heat, sparks, electrostatic discharge and open flame. Store in a cool, dry place. 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.

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## 8. Exposure Controls, Personal Protection

### Airborne Exposure Limits:

- OSHA Permissible Exposure Limit (PEL) 1 mg/m<sup>3</sup> (TWA)
- ACGIH Threshold Limit Value (TLV) 1.5 mg/m<sup>3</sup> (TWA), inhalable fraction
- NIOSH Recommended Exposure Limit (REL) 0.015mg/m<sup>3</sup> (TWA)
- NIOSH Immediately Dangerous to Life or Health Concentration (IDLH) 10 mg/m<sup>3</sup> (as Ni)

**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.

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## 9. Physical and Chemical Properties

<b>Appearance:</b>	Black powder with an average particle size of 5 – 20 nanometers.
<b>Odor:</b>	Odorless
<b>Solubility:</b>	Insoluble in water
<b>Theoretical Density:</b>	8.90 g/cm <sup>3</sup>
<b>Bulk Density:</b>	0.2 g/cm <sup>3</sup>
<b>Molecular Weight:</b>	58.71 AMU
<b>pH:</b>	Not available
<b>Boiling Point:</b>	2732C (4950F)
<b>Melting Point:</b>	1453C (2647F)

Vapor Density (Air=1): Not available  
 Vapor Pressure: 1mm Hg at 1810C  
 Evaporation Rate: Not available  
 Viscosity: Not applicable  
 Decomposition Temperature: Not available

### 10. Stability and Reactivity

**Chemical Stability:** Stable under ordinary conditions of use and storage. Avoid exposure to moisture.  
**Hazardous Decomposition Products:** Nickel oxides, carbon monoxide, carbon dioxide, toxic and highly flammable nickel carbonyl.  
**Hazardous Polymerization:** Will not occur.  
**Incompatibilities:** Nickel is incompatible with acids, oxidizing agents, organic solvents, and sulfur.  
**Conditions to Avoid:** Ignition sources, excess heat, dust generation, incompatibles and exposure to moisture.

### 11. Toxicological Information

**Route of Exposure**

**Skin Contact:** Prolonged and intimate contact with metallic nickel may cause irritation to the skin and nickel sensitivity which may result in allergic skin rashes.  
**Eye Contact:** May cause eye irritation.  
**Inhalation:** May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.  
**Ingestion:** May be harmful if swallowed.  
**NTP Known Carcinogen:** Yes  
**NTP Anticipated Carcinogen:** Yes  
**IARC Category:** Group 1 carcinogen (listed as Nickel compounds)  
**California Carcinogen:** Yes

### 12. Ecological Information

**Environmental:** No information reported.  
**Environmental Toxicity:** No data available.

### 13. Disposal Considerations

Contact a licensed professional waste disposal service to dispose of this material. Processing, use or contamination of this product may change the waste management options. Observe all Federal, State, and Local environmental regulations.

### 14. Transport Information

	US DOT	Canada TDG
Shipping Name	METAL POWDERS, FLAMMABLE, NOS (NICKEL)	METAL POWDER FLAMMABLE NOS (NICKEL)



<b>Hazard Class</b>	4.1	4.1
<b>UN Number</b>	UN3089	UN3089
<b>Packing Group</b>	II	II

### 15. Regulatory Information

--Chemical Inventory Status – Part 1--

Ingredient	TSCA	EC	Japan	Australia
Nickel (7440-02-0)	Yes	see below	not avail.	No

Chemical Inventory Status – Part 2-

Ingredient	Korea	--Canada--		Phil.
		DSL	NDSL	
Nickel (7440-02-0)	not avail.	Yes	No	not avail

Federal, State & International Regulations – Part 1-

Ingredient	--SARA 302--		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Nickel (7440-02-0)		No	Yes	

Federal, State & International Regulations – Part 2 -

Ingredient	CERCLA	-RCRA-	-TSCA-
Nickel (7440-02-0)	100 lb. final RQ*	261.33	8 (d)

\*no reporting of releases of this hazardous substance is required.

Chemical Weapons Convention: No

TSCA 12(b): Not listed.

CDTA: No

SARA 311/312: Acute: Yes, Chronic: Yes, Flammable: Yes, Pressure: No, Reactivity: No

Clean Air Act: Hazardous pollutant; does not contain any Class 1 or Class 2 Ozone depleters.

Clean Water Act: Priority pollutant, toxic pollutant.

**European/International Regulations:**

European labeling in accordance with EC Directives

**Hazard Symbols:** XN F

**Risk Phrases:**

R11 Highly flammable.

R40 Limited evidence of a carcinogenic effect.

R43 May cause sensitization by skin contact.

**Safety Phrases:**

S16 Keep away from sources of ignition – No smoking.

S22 Do not breathe dust.

S36 Wear suitable protective clothing.

**Poison Schedule:** None allocated.

**Canada - WHMIS:** classification B4 and D2A

**Canada Ingredient Disclosure List:** Yes

## 16. Other Information

**Label Hazard Warning:** WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE NASAL OR LUNG DAMAGE. MAY CAUSE ALLERGIC SKIN OR RESPIRATORY REACTION. CANCER HAZARD.

**Label Precautions:** Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Avoid breathing dust or vapors. Keep container closed. Use only with adequate ventilation.

**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.

**Disclaimer:**

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