Material Safety Data Sheet
QSI-Nano® Gas Diffusion Electrode

1. Product and Company Identification

PRODUCT NAME: QSI-Nano® Gas Diffusion Electrode
SYNONYMS: Air Cathode

MANUFACTURER: QuantumSphere, Inc.
ADDRESS: 2905 Tech Center Drive
Santa Ana, CA 92705

EMERGENCY PHONE (CHEMTREC): (800) 424-9300
OTHER CALLS: (714) 545-6266
FAX: (714) 545-6265

2. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No</th>
<th>Percent</th>
<th>Hazardous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>0 – 5%</td>
<td>Yes</td>
</tr>
<tr>
<td>Manganese-Oxide</td>
<td>1317-35-7</td>
<td>0 – 5%</td>
<td>Yes</td>
</tr>
<tr>
<td>Polytetrafluoroethylene</td>
<td>9002-84-0</td>
<td>3- 20%</td>
<td>No</td>
</tr>
<tr>
<td>Carbon</td>
<td>7440-44-0</td>
<td>30-60%</td>
<td>Yes</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>30-60%</td>
<td>Yes</td>
</tr>
</tbody>
</table>

CHEMICAL NAME: N/A
CHEMICAL FAMILY: N/A
CHEMICAL FORMULA: N/A

3. Hazards Identification

Emergency Overview
Avoid breathing vapor or dust. Use adequate ventilation. Avoid contact with eyes, skin, or clothes. Wash thoroughly after handling. Keep closed.

Potential Acute Health Effects

Inhalation: May cause mild irritation to the respiratory tract. The acute inhalation LC50 (Rat) is >64.4 mg/l (nominal concentration) for activated carbon.

Ingestion: May be harmful if swallowed. May cause irritation to the gastrointestinal tract. The acute oral LD50 (Rat) is >10g/kg.
Skin: Not expected to be a health hazard from skin exposure. May cause mild irritation and redness. The primary skin irritation index (Rabbit) is 0.

Eye: No adverse effects expected. May cause mild irritation, possible reddening.

Potential Chronic Health Effects

Cancer causing agent, nickel. Prolonged inhalation of excessive dust may produce pulmonary disorders. The effects of long-term, low-level exposures to this product have not been determined. Safe handling of this material on a long-term basis should emphasize the avoidance of all effects from repetitive acute exposures.

Safety Data

HMIS Ratings:
Health=2, Flammability=1, Reactivity=1

Lab Protective Equip:

GOGGLES; LAB COAT; CLASS B EXTINGUISHER

4. First Aid Measures

Ingestion: Give several glasses of water to drink to dilute. If large amounts were swallowed, seek medical attention.

Inhalation: Remove to fresh air. Get medical attention for any breathing difficulty.

Skin Contact: Not expected to require first aid measures. Wash exposed area with soap and water. Seek medical attention if irritation develops.

Eye Contact: Wash thoroughly with running water for at least 15 minutes. Seek medical attention if irritation develops.

5. Fire Fighting Measures

Fire:
As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source. Activated carbon is difficult to ignite and tends to burn slowly (smolder) without producing smoke or flame. Wet activated carbon depletes oxygen from the air. Materials allowed to smolder for long periods in enclosed spaces, may produce amounts of carbon monoxide which may reach the lower explosive limit for carbon monoxide of 12.5% in air. Contact with strong oxidizers such as ozone or liquid oxygen may cause rapid combustion.

Explosion: Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Minimum explosive concentration 0.140 g/l.

Fire Extinguishing Media: Water spray, dry chemical, alcohol foam, or carbon dioxide.

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

6. Accidental Release Measures

Remove all sources of ignition. Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Clean up spills in a manner that does not disperse dust into the air. Use non-sparking tools and equipment. Reduce airborne dust and prevent scattering by
moisten with water. Pick up spill for recovery or disposal and place in a closed container. Warning! Spent product may have absorbed hazardous materials.

7. Handling and Storage

Handling:
Avoid contact with skin and eyes. Avoid breathing dust. Use only with adequate ventilation. Always use Neoprene or Nitrile protective gloves and safety glasses. NIOSH certified respirators are recommended and will be useful for protecting workers from nanoparticle inhalation when opening/emptying containers or processing this material. Do not eat or drink in work area. Wash with soap and water after exposure to any dust. Keep away from incompatibles such as acetylene, ammonia, and strong oxidizers.

Storage:
Storage Color Code: Green (General Storage)

8. Exposure Controls, Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust or fume, use ventilation to keep exposure to airborne contaminants below the exposure limit.

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 nanoparticle 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.

Protective Gloves:
Use Neoprene or Nitrile protective gloves, to prevent irritation.

Eye and Face Protection:
Wear safety glasses or face shield and an approved respirator in operations that disperse fine particles into the air.

Other Protective Equipment:
To prevent repeated or prolonged skin contact, wear impervious clothing and boots. An eyewash fountain should be readily available in areas of use of handling.

Ventilation:
Use local exhaust ventilation directed towards the source of dust to keep airborne levels below recommended exposure limits.

9. Physical and Chemical Properties
Appearance: Black powder with a particle range of 3 – 20 nanometers or laminated strips
Odor: Odorless
Solubility: Insoluble in water
Specific Gravity @ 25 °C: N/A
Boiling Point: N/A
Melting Point: N/A
% Volatile by weight: Essentially Zero
% Volatile by volume: Essentially Zero
Vapor Density (Air=1): N/A
Vapor Pressure: N/A
Evaporation Rate: Zero

10. Stability and Reactivity

Stability: Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products: Involvement in a fire causes formation of carbon dioxide and carbon monoxide.

Hazardous Polymerization: Will not occur.

Incompatibilities: Strong oxidizers such as ozone, liquid oxygen, chlorine, permanganate, etc. may result in rapid combustion. Avoid contact with strong acids and sulfur.

Conditions to Avoid: Moisture and incompatibles.

11. Toxicological Information

Primary Routes of Entry: Inhalation, Skin Contact, Eye, Ingestion

Human Effects and Symptoms of Exposure: Skin: May cause dermatitis; Eye: Will cause irritation

Medical Conditions Aggravated by Exposure: Individuals who may have had allergic reactions to metals or sensitivity, may encounter skin rash or dermatitis if skin comes in contact with product. Persons with impaired pulmonary functions may incur further impairment if inhaled.

Carcinogenicity: CAS#7439-96-5: Not Listed By NTP, IARC, NIOSH, OSHA, or ACGIH

Investigated as a reproductive effector.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Known</th>
<th>Anticipated</th>
<th>IARC Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activated Carbon (7440-44-0)</td>
<td>No</td>
<td>No</td>
<td>None</td>
</tr>
<tr>
<td>Nickel (7440-02-0)</td>
<td>No</td>
<td>Yes</td>
<td>Group 2B-Possibly carcinogenic</td>
</tr>
</tbody>
</table>

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
Proper Shipping Name:
NOT DANGEROUS GOODS
Hazard Class:
N/A
Identification Number:
N/A
Packing Group:
N/A
This product has been tested according to the United Nations Transport of Dangerous Goods test protocol for spontaneously combustible materials. It has been specifically determined that this product does not meet the definition of a self heating substance or any hazard class, and therefore is not a hazardous material and not regulated.

15. Regulatory Information
SARA Title III:
No materials subject to SARA Title III, Section 302 reporting requirements
European/International Regulations:
This product is on the European Inventory of Existing Commercial Chemical Substances
TSCA Status:
The ingredients of this product are on the TSCA Inventory List.
RCRA Status:
Not Applicable
OSHA Status:
Target Organ Effect, Carcinogen

California Prop. 65 Components
Warning! This product contains a chemical known in the State of California to cause cancer.
Nickel CAS-No. 7440-02-0 Revision Date 1989-10-01

16. Other Information
NFPA Ratings: Health: 0 Flammability: 1 Reactivity: 0
Label Hazard Warning: CAUTION! ACTIVATED CARBON AFFECTS THE RESPIRATORY AND
CARDIOVASCULAR SYSTEMS.

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

Label First Aid:
If inhaled, remove to fresh air. Get medical attention for any breathing difficulty.

Product Use:
Laboratory Reagent.
Product Use: Electrochemical

Disclaimer:
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