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Material Safety Data Sheet

QSI-Nano® Cobalt/Cobalt Oxide Powder

1. Product and Company Identification

PRODUCT NAME: QSI-Nano® Cobalt Powder
SYNONYMS: Co / Co₃O₄

MANUFACTURER: QuantumSphere, Inc.
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2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Cobalt	7440-48-4	30-90%	Yes
Cobalt(II,III) oxide	1308-06-1	balance	Yes

CHEMICAL NAME: Cobalt / Cobalt Oxide
CHEMICAL FAMILY: Metal / Metal Oxide Powder
CHEMICAL FORMULA: Co / Co₃O₄

3. Hazards Identification

Emergency Overview

Black powder. May cause sensitization by skin contact which may produce allergic contact dermatitis. May cause sensitization by inhalation which may produce occupational asthma. May cause respiratory irritation.

Target organ(s): Nasal cavities, lungs, skin.

Safety Data

HMIS Ratings: Health=1*, Flammability=2, Reactivity=0 *Chronic health hazard
Lab Protective Equip: Goggles; Lab coat

Potential Health Effects

Inhalation: Cobalt is a known allergen that produces characteristic symptoms of asthma, such as wheezing, dry cough, and labored breathing. Usually the asthma symptoms appear 4-6 hours after exposure and often worsen again later in the same day. Even later asthma reactions to inhaled cobalt may occur up to 48 hours after exposure. Improvement typically occurs when cobalt exposure ceases, e.g. weekends, vacations. Other cobalt-containing compounds such as hard metal dust, but not cobalt powder itself, are associated with sub acute fibrosis alveolitis and chronic diffuse interstitial pulmonary fibrosis.

Ingestion: There are no known reports of adverse health effects from cobalt ingestion in the workplace setting.

Skin Contact: May cause allergic contact dermatitis if there is prior sensitization. Most rashes associated with cobalt occur on the hands and appear within the first year of occupational exposure.

Eye Contact: May cause eye irritation.

4. First Aid Measures

Inhalation: Remove from exposure. Provide ventilation assistance and oxygen as indicated. Physician should administer usual asthma medications for acute attacks.

Ingestion: Give large amounts of water to drink if the person is completely conscious. Get medical attention as a precaution.

Skin Contact: Remove victim from contaminated area. Wash immediately and thoroughly with soap or mild detergent and water. Remove and isolate contaminated jewelry, clothing, and shoes. Gently brush away excess solid contaminate. Consult a physician if irritation persists.

Eye Contact: Flush with copious amounts of water for at least 15 minutes or until irritation subsides, whichever is longer.

5. Fire Fighting Measures

Flash Point: Not applicable.

OSHA Flammability Classification: Not applicable.

Pyrophoric/Autoignition: Not known.

Explosion: High concentrations of dust may present a dust explosion hazard. Fine metal and metal oxide dust may occur during a fire.

Fire Extinguishing Media: Dry chemical, carbon dioxide, sand.

6. Accidental Release Measures

The spill should first be contained and the area should be cleaned by wet-sweeping or vacuum cleaning (HEPA filter). Minimize the creation of dust. Approved NIOSH respirator should be worn.

7. Handling and Storage**Handling:**

Avoid contact with skin and eyes. Avoid breathing dust. Use only with adequate ventilation. Always use gloves and safety glasses when opening/emptying containers or processing this material. Do not eat or drink in work area. Wash in soap and water after exposure to any dust.

Storage:

This material should be stored in sealed containers to avoid dampness and dust. Partly used containers should be sealed. Otherwise, no special precautions are required.

8. Exposure Controls, Personal Protection

Engineering Controls:

Proper ventilation should be installed in order to maintain cobalt dust concentration in the air below the occupational exposure limits.

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.

Protective Gloves:

Gloves, rubber or impervious coating.

Eye and Face Protection:

Wear safety glasses or face shield in operations that disperse fine particles into the air.

Other Protective Equipment:

To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

Ventilation:

Use local exhaust ventilation directed towards the source of dust and which is adequate to limit personal exposure to levels which do not exceed the PEL or TLV. If such equipment is not available use respirators as specified above.

9. Physical and Chemical Properties

Appearance:	Black powder with an average particle size of 5 – 20 nanometers.
Odor:	Odorless
Solubility:	Insoluble in water
Specific Gravity @ 25 °C	8.86g/cm ³
Boiling Point:	2870 °C
Melting Point:	1493 °C
% Volatile by weight	0
% Volatile by volume	0
Vapor Density (Air=1):	Not Applicable
Vapor Pressure:	Nil at ambient temperatures
Evaporation Rate:	0

10. Stability and Reactivity

Chemical Stability: Stable.

Hazardous Decomposition Products: Toxic fumes of cobalt oxide.

Hazardous Polymerization: Will not occur.

Incompatibilities: Acids, strong oxidizers.

Conditions to Avoid: Avoid dust generation, excess heat, incompatibilities.

11. Toxicological Information

Cobalt has not been shown to be carcinogenic to humans. The National Toxicological Program (NTP) does not recognize cobalt as an animal or human carcinogen. The International Agency for Research on Cancer (IARC) classifies cobalt as “possible carcinogenic” to humans (Class 2B) based on animal studies. Refer to the IARC website (www.iarc.fr) for most recent information.

Workers with occupational asthma arising from cobalt powder are sensitized as may be demonstrated by a positive bronchoprovocation challenge test with cobalt chloride. However, this test is not widely available and should only be performed by physicians experienced in the procedure. This latter test is widely available. Cobalt-related asthma may include early, late, and dual reactions. The late reaction may appear up to 48 hours after exposure. Improvement typically occurs with cessation of exposure, such as weekends and vacations. Patch test and intradermal skin tests do not discriminate patients with cobalt-related asthma from controls in the general population.

Cobalt-induced allergic contact dermatitis is characterized by erythematous papules occurring commonly on the hands. The prevalence of this condition in the workplace may be 10-15%. Most cobalt-related rashes begin in the first year of employment where cobalt is used. Risk factors include prior nickel sensitization and irritant dermatitis. 25% of nickel-sensitive individuals develop cobalt allergy compared with 5% of the general population. Sensitization to nickel and cobalt result from co-exposure rather than cross-reactivity. The diagnosis of cobalt sensitivity may be made by patch testing. However, the diagnosis of cobalt sensitivity is complicated by the fact that nickel contamination of cobalt patch tests may produce false positive skin tests in patients who are highly sensitive to nickel.

Acute Oral LD50: >7000mg/kg (oral rat)

Acute Dermal LD50: No data at this time.

Acute Inhalation: No data at this time.

12. Ecological Information

Environmental: No information reported.

Environmental Toxicity: No data available.

13. Disposal Considerations

Disposal should be made in accordance with Federal, State, and Local regulations. Cobalt spills can be swept up and, if uncontaminated, re-used. Cobalt can be recycled and consideration of this route should be given. This product is not regulated as a hazardous waste under RCRA but may be regulated in certain States. Dispose of in accordance with Federal, State, and Local laws.

14. Transport Information

	US DOT	Canada TDG
Shipping Name	Metal Powder, Flammable, NOS	-
Hazard Class	4.1	-
UN Number	UN3089	UN3089
Packing Group	II	II

15. Regulatory Information

SARA 302 Extremely Hazardous Substance List:

This product does not contain greater than 1% of any chemical substance on the SARA Extremely Hazardous Substance List.

European/International Regulations:

European labeling in accordance with EC Directives

16. Other Information

Label Hazard Warning: WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY CAUSE ALLERGIC SKIN OR RESPIRATORY REACTION. CHRONIC EXPOSURE MAY AFFECT THYROID, LUNGS, HEART, AND KIDNEYS.

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

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, get medical attention.

Product Use: Laboratory Reagent.

Disclaimer:

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