

Zinc Manganese Iron Oxide Nanoparticles (Zn_{0.5}Mn_{0.5} Fe₂O₄)

US Research Nanomaterials, Inc.

Material Safety Data Sheet

acc. to OSHA and ANSI

• 1 Identification of substance:

• Product details:

• **Product name:** Zinc-Manganese iron oxide

• **Stock number:** US3988

• **Manufacturer/Supplier:**

US Research Nanomaterials, Inc.

3302 Twig Leaf Lane

Houston, Texas 77084, USA

www.us-nano.com

• 2 Composition/Data on components:

• **Chemical characterization:**

Description: (CAS#)

Zinc-Manganese iron oxide

• 3 Hazards identification

• **Hazard description:** Xn Harmful

• **Information pertaining to particular dangers for man and environment**

R 22 Harmful if swallowed.

R 43 May cause sensitization by skin contact.

• **Classification system**

• **HMIS ratings (scale 0-4)**

(Hazardous Materials Identification System)

Health (acute effects) = 1

Flammability = 0

Reactivity = 0

- **4 First aid measures**

- **After inhalation**

Supply fresh air and to be sure call for a doctor.

Supply fresh air. If required, provide artificial respiration. Keep patient warm.

Seek immediate medical advice.

- **After skin contact**

Immediately wash with water and soap and rinse thoroughly.

Seek immediate medical advice.

- **After eye contact**

Rinse opened eye for several minutes under running water. Then consult a doctor.

- **After swallowing** Seek immediate medical advice.

- **5 Fire fighting measures**

- **Suitable extinguishing agents**

Carbon dioxide, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

- **Special hazards caused by the material, its products of combustion or resulting gases:**

In case of fire, the following can be released:

Metal oxide fume

- **Protective equipment:**

Wear self-contained respirator.

Wear fully protective impervious suit.

- **6 Accidental release measures**

- **Person-related safety precautions:**

Wear protective equipment. Keep unprotected persons away.

Ensure adequate ventilation

- **Measures for environmental protection:**

Do not allow material to be released to the environment without proper governmental permits.

- **Measures for cleaning/collecting:**

Dispose contaminated material as waste according to item 13.

- **Additional information:**

See Section 7 for information on safe handling

See Section 8 for information on personal protection equipment.

See Section 13 for disposal information.

• **7 Handling and storage**

• **Handling**

• **Information for safe handling:**

Keep container tightly sealed.

Store in cool, dry place in tightly closed containers.

Ensure good ventilation at the workplace.

• **Information about protection against explosions and fires:**

No special measures required.

• **Storage**

• **Requirements to be met by storerooms and receptacles:**

No special requirements.

• **Information about storage in one common storage facility:**

No information known.

• **Further information about storage conditions:**

Keep container tightly sealed.

Store in cool, dry conditions in well sealed containers.

• **8 Exposure controls and personal protection**

• **Additional information about design of technical systems:**

Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:

Cobalt, elemental & inorganic compounds, as Co

	mg/m ³
ACGIH TLV	0.02; Confirmed animal carcinogen
Austria	Carcinogen
Belgium TWA	0.05
Denmark TWA	0.05
Finland TWA	0.05 (skin)
Germany	Carcinogen
Hungary TWA	0.1; 0.2-STEL
Japan OEL	0.05; 2B-Carcinogen
Korea TLV	0.02; Confirmed animal carcinogen
Netherlands MAC-TGG	0.05
Norway TWA	0.05
Poland TWA	0.05; 0.2-STEL

Russia 0.5-STEL
 Sweden NGV 0.05
 Switzerland MAK-W 0.1; Carcinogen
 United Kingdom TWA 0.1
 USA PEL 0.1 (dust and fume)

- **Additional information:** No data

- **Personal protective equipment**

- **General protective and hygienic measures**

The usual precautionary measures for handling chemicals should be followed.

Keep away from foodstuffs, beverages and feed.

Remove all soiled and contaminated clothing immediately.

Wash hands before breaks and at the end of work.

- **Breathing equipment:**

Use suitable respirator when high concentrations are present.

- **Protection of hands:** Impervious gloves

- **Eye protection:** Safety glasses

- **Body protection:** Protective work clothing.

- **9 Physical and chemical properties:**

- **General Information**

- **Form:** Powder

- **Color:** Dark brown

- **Odor:** Not determined

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- **Change in condition**

- **Melting point/Melting range:** Not determined

- **Boiling point/Boiling range:** Not determined

- **Sublimation temperature / start:** Not determined

- **Flash point:** Not applicable

- **Ignition temperature:** Not determined

- **Decomposition temperature:** Not determined

- **Danger of explosion:**

Product does not present an explosion hazard.

- **Explosion limits:**

- **Lower:** Not determined

- **Upper:** Not determined

	<u>Value/Range</u>	<u>Unit</u>	<u>Method</u>
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- **Vapor pressure:** Not determined
- **Density:** ~ 5.2 g/cm³
- **Solubility in / Miscibility with**
- **Water:** Not determined

- **10 Stability and reactivity**

- **Thermal decomposition / conditions to be avoided:**
Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:** None known.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:** Metal oxide fume

- **11 Toxicological information**

- **Acute toxicity:**
- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** Sensitization possible through skin contact.
- **Subacute to chronic toxicity:**
Cobalt is an experimental neoplastigen and tumorigen. It is an experimental carcinogen of the connective tissue and lungs. Cobalt metal and inorganic compounds are classified as an animal carcinogen by the ACGIH. Ingestion may cause burning in the mouth, esophagus, and stomach. Inhalation of dusts and fumes may cause irritation of the respiratory tract and labored breathing and coughing. Sensitization, nausea, flushing of the face and ringing in the ears is also possible. Chronic ingestion may result in pericardial effusion, polycardial effusion, polycythemia, cardiac failure, vomiting, convulsions and thyroid enlargement.
Iron compounds may cause vomiting, diarrhea, pink urine, black stool, and liver damage. May cause damage to the kidneys. Irritating to the respiratory tract, they may cause pulmonary fibrosis if dusts are inhaled.
- **Additional toxicological information:**
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
IARC-2B: Possibly carcinogenic to humans: limited evidence in humans in the absence of sufficient evidence in experimental animals.
ACGIH A3: Animal carcinogen: Agent is carcinogenic in experimental

animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

• **12 Ecological information:**

• **General notes:**

Do not allow material to be released to the environment without proper governmental permits.

• **13 Disposal considerations**

• **Product:**

• **Recommendation**

Consult state, local or national regulations to ensure proper disposal.

• **Uncleaned packagings:**

• **Recommendation:**

Disposal must be made according to official regulations.

• **14 Transport information**

Not a hazardous material for transportation.

• **DOT regulations:**

• **Hazard class:** None

• **Land transport ADR/RID (cross-border)**

• **ADR/RID class:** None

• **Maritime transport IMDG:**

• **IMDG Class:** None

• **Air transport ICAO-TI and IATA-DGR:**

• **ICAO/IATA Class:** None

• **Transport/Additional information:**

Not dangerous according to the above specifications.

• **15 Regulations**

- **Product related hazard informations:**

- **Hazard symbols:** Xn Harmful

- **Risk phrases:**

22 Harmful if swallowed.

43 May cause sensitization by skin contact.

- **Safety phrases:**

24 Avoid contact with skin.

37 Wear suitable gloves.

- **National regulations**

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical substance Inventory.

- **Information about limitation of use:**

For use only by technically qualified individuals.

This product contains cobalt and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

- **16 Other information:**

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Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.