

# NANOMATERIALS & NANOFABRICATION LABORATORIES

## MSDS SHEET

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### Iron Oxide (Fe<sub>3</sub>O<sub>4</sub>) in Water

#### 1. PRODUCT IDENTIFICATION

**CAS No.:** 1317-61-9

**Inorganic Unit (Fe<sub>3</sub>O<sub>4</sub>):** 231.535

**Chemical Name:** Iron Oxide Nanocrystals

**Chemical Formula:** Fe<sub>3</sub>O<sub>4</sub> [Iron (II,III) oxide]

**Chemical Family:** Metal Oxides

**Typical Solvents (CAS No):** Water 7732-18-5

#### 2. COMPOSITION/INFORMATION ON INGREDIENT (EACH VIAL)

<u>Substance Name</u>	<u>CAS #</u>	<u>Percentage of Whole (by weight)</u>
Iron Oxide	1317-61-9	3.0%
Water	7732-18-5	96%
Stabilizing Ligands		1%

#### 3. HAZARDS IDENTIFICATION

Irritating to eyes, respiratory system, and skin.

**HMIS ratings (scale 0-4)** (Iron Oxide only, does not include solvent)

Health = 1

Flammability = 0

Reactivity = 0

#### 4. FIRST AID MEASURES

**Inhalation :** Supply fresh air. If required, provide artificial respiration. Keep patient warm. Seek immediate medical advice.

**Skin contact:** Immediately wash with water and soap and rinse thoroughly. Seek immediate medical advice.

**Eye contact :** Rinse opened eye for several minutes under running water. Then consult a doctor.

**Ingestion:** Seek immediate medical advice.

#### 5. FIRE FIGHTING MEASURES

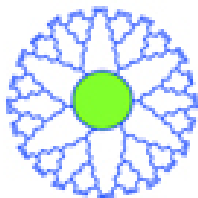
**Suitable extinguishing agents:** Product is not flammable.

**Protective equipment:** Wear self-contained respirator if necessary. Wear protective gloves.

#### 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.



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**Measures for cleaning/collecting:** Dispose contaminated material as waste according to item 12. Ensure adequate ventilation.

### 7. HANDLING AND STORAGE

**Information for safe handling:** Keep container tightly sealed. Store at room temperature in a tightly sealed container. Ensure good ventilation at the workplace. Store dissolved in solvent to prevent the formation of dust.

**Information about protection against explosions and fires:** Know the requirements of the necessary solvent.

**Requirements to be met by storerooms and receptacles:** No special requirements.

**Information about storage in one common storage facility:** Do not store together with acids.

**Further information about storage conditions:** Keep container tightly sealed. Store at room temperature in a tightly sealed container. Ensure good ventilation at the workplace. Store dissolved in solvent to prevent the formation of dust.

### 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.

**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. Avoid contact with the eyes and skin.

**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:

**Form:** Liquid form. Crystalline powder, dissolved in a solvent.

**Color:** Black

**Odor:** Odor dependent upon solvent used. Crystalline powder is odorless.

**Melting point/Melting range:** ~1538°C to bulk melting point of Fe<sub>3</sub>O<sub>4</sub> crystals. The solvent is liquid and depends on the chemical composition of the solvent.

**Boiling point/Boiling range:** Determined by solvent used.

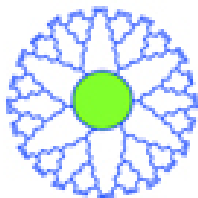
**Sublimation temperature / start:** Not determined.

**Flash point:** Dependent upon solvent used.

**Ignition temperature:** Dependent upon solvent used.

**Decomposition temperature:** Not determined.

**Danger of explosion:** Dependent upon solvent used. Crystalline powder does not present an explosion hazard.



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**Explosion limits:** Currently unknown for nanocrystals.

**Vapor pressure:** Dependent upon solvent used.

**Density:** 5.2 g/cm<sup>3</sup> (crystal at 20 °C) for the nanocrystal powder if isolated.

**Solubility in / Miscibility with Polar Solvents:** Soluble when hydrophilic ligands are present.

### 10. STABILITY AND REACTIVITY

**Thermal decomposition / conditions to be avoided:** Not determined, but temperature increases will effect the solvent used. Be aware of the necessary warnings for the specific solvent used.

**Materials to be avoided:** Acids, Bases, Oxidants, Reductants, and Ligands to the nanocrystals should be used with caution.

**Dangerous reactions:** No dangerous reactions known for nanocrystals but look up specifics for the solvent

### 11. TOXICOLOGICAL INFORMATION (For Iron Oxide Only)

**Skin:** Irritant to skin and mucous membranes.

**Eye:** Irritating effect.

**Sensitization:** No sensitizing effects known.

**Additional toxicological information:** Danger through skin absorption is unknown.

To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.

However, preliminary studies suggest Iron Oxide nanocrystals are not toxic.

**Target Organs:** Possibly Liver and Kidney

**EPA-B1:** Not Carcinogenic

**IARC-1:** Not Carcinogenic

**NTP-2:** Not Carcinogenic

**ACGIH A2:** Not Carcinogenic

**WARNING:** Many of the toxic effects of Iron Oxide nanocrystals are still being researched and are currently unknown at this point. Use at own risk.

### 12. ECOLOGICAL INFORMATION:

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

### 13. DISPOSAL CONSIDERATIONS

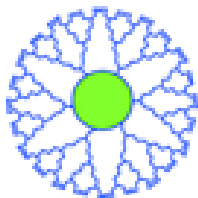
Consult local or national regulations for proper disposal.

### 14. REGULATIONS

**Hazard symbols:** Xi Irritant

**Risk phrases:** R36/R37/R38 Irritating to eyes, respiratory system and skin

**Safety phrases:** (22) Do not breathe dust or vapors. (26) In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. (37/39) Wear suitable gloves and eye/face protection.



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**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.