SAFETY DATA SHEET

1. Identification

Product identifier: Ferric Oxide

Other means of identification
Product No.: 5493, 5424, 2024

Recommended use and restriction on use
   Recommended use: Not available.
   Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor Information

Manufacturer
Company Name: Avantor Performance Materials, Inc.
Address: 3477 Corporate Parkway, Suite 200
         Center Valley, PA 18034
Telephone: Customer Service: 855-282-6867
Fax: Contact Person: Environmental Health & Safety
     e-mail: info@avantormaterials.com

Emergency telephone number:
   24 Hour Emergency: 908-859-2151
   Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard Classification
   Not classified

Label Elements
   Hazard Symbol: No symbol
   Signal Word: No signal word.
   Hazard Statement: Not applicable
   Precautionary Statement: Not applicable

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>Content in percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRON OXIDE, Fe₂O₃</td>
<td></td>
<td>1309-37-1</td>
<td>60 - 100%</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth thoroughly. Get medical attention if symptoms occur.

Inhalation: Move to fresh air. Get medical attention if symptoms persist.

Skin Contact: Wash skin thoroughly with soap and water. Get medical attention if irritation persists after washing. Wash contaminated clothing before reuse.

Eye contact: Flush thoroughly with water. If irritation occurs, get medical assistance.

Most important symptoms/effects, acute and delayed

Symptoms: May cause irritation to skin, eyes, and respiratory tract.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically.

5. Fire-fighting measures

General Fire Hazards: The product is non-combustible.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, fog, CO2, dry chemical, or regular foam.

Unsuitable extinguishing media: None known.

Specific hazards arising from the chemical: During fire, gases hazardous to health may be formed. Contact with strong oxidizers may cause fire.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorized personnel away. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment.

Methods and material for containment and cleaning up: Avoid dust formation. Sweep up and place in a clearly labeled container for chemical waste. Clean surface thoroughly to remove residual contamination.

Notification Procedures: Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.
Environmental Precautions: Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Avoid generation and spreading of dust. Ground/bond container and receiving equipment. Use personal protective equipment as required. Avoid contact with eyes, skin, and clothing. Avoid inhalation of dust. Wash thoroughly after handling.

Conditions for safe storage, including any incompatibilities: Keep containers tightly closed. Store in cool, dry place. Store in a well-ventilated place.

8. Exposure controls/personal protection

Control Parameters

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Type</th>
<th>Exposure Limit Values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRON OXIDE, $\text{Fe}_2\text{O}_3$ - Respirable fraction.</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>US. ACGIH Threshold Limit Values (2011)</td>
</tr>
<tr>
<td>IRON OXIDE, $\text{Fe}_2\text{O}_3$ - Dust and fume. - as Fe</td>
<td>REL</td>
<td>5 mg/m³</td>
<td>US. NIOSH: Pocket Guide to Chemical Hazards (2010)</td>
</tr>
<tr>
<td>IRON OXIDE, $\text{Fe}_2\text{O}_3$ - Fume.</td>
<td>PEL</td>
<td>10 mg/m³</td>
<td>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>10 mg/m³</td>
<td>US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)</td>
</tr>
</tbody>
</table>

Appropriate Engineering Controls

No data available.

Individual protection measures, such as personal protective equipment

- **General information:** Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Use explosion-proof ventilation equipment.

- **Eye/face protection:** Use tight fitting goggles if dust is generated.

- **Skin Protection**
  - **Hand Protection:** Wear protective gloves.
  - **Other:** Wear suitable protective clothing.

- **Respiratory Protection:** In case of inadequate ventilation use suitable respirator.

- **Hygiene measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Provide eyewash station and safety shower.

9. Physical and chemical properties

**Appearance**

- **Physical state:** Solid
- **Form:** Powder.
- **Color:** Red brown
Odor: Odorless
Odor threshold: No data available.
P.H: No data available.
Melting point/freezing point: 1,565 °C
Initial boiling point and boiling range: No data available.
Flash Point: No data available.
Evaporation rate: No data available.
Flammability (solid, gas): No data available.
Upper/lower limit on flammability or explosive limits
  Flammability limit - upper (%): No data available.
  Flammability limit - lower (%): No data available.
  Explosive limit - upper (%): No data available.
  Explosive limit - lower (%): No data available.
Vapor pressure: No data available.
Vapor density: No data available.
Relative density: 5.24 (20 °C)
Solubility(ies)
  Solubility in water: Insoluble in water
  Solubility (other): hydrochloric acid: Soluble
  nitric acid: Slightly Soluble
  sulfuric acid: Soluble
Partition coefficient (n-octanol/water): No data available.
Auto-ignition temperature: No data available.
Decomposition temperature: No data available.
Viscosity: No data available.
Other information
  Molecular weight: 159.7 g/mol (Fe2O3)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.
Chemical Stability: Material is stable under normal conditions.
Possibility of Hazardous Reactions: Hazardous polymerization does not occur.
Conditions to Avoid: Contact with incompatible materials. Heat, sparks, flames. Avoid dust formation.
Incompatible Materials: Acids.
Hazardous Decomposition Products: Not determined.

11. Toxicological information

Information on likely routes of exposure
  Ingestion: May cause irritation of the gastrointestinal tract.
  Inhalation: May cause irritation to the respiratory system.
  Skin Contact: May cause irritation.
  Eye contact: May cause temporary eye irritation.
Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: No data available.

Dermal
Product: No data available.

Inhalation
Product: No data available.

Repeated Dose Toxicity
Product: No data available.

Skin Corrosion/Irritation
Product: May cause skin irritation.

Serious Eye Damage/Eye Irritation
Product: May irritate eyes.

Respiratory or Skin Sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: This substance has no evidence of carcinogenic properties.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:
No carcinogenic components identified

US. National Toxicology Program (NTP) Report on Carcinogens:
No carcinogenic components identified

No carcinogenic components identified

Germ Cell Mutagenicity
In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive Toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: No data available.

Specific Target Organ Toxicity - Repeated Exposure
Product: No data available.

Aspiration Hazard
Product: Not classified

Other Effects: None known.
12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic Invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and Degradability

Biodegradation
Product: There are no data on the degradability of this product.

BOD/COD Ratio
Product: No data available.

Bioaccumulative Potential

Bioconcentration Factor (BCF)
Product: No data available on bioaccumulation.

Partition Coefficient n-octanol / water (log Kow)
Product: No data available.

Mobility in Soil: No data available.

Other Adverse Effects: The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated Packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT
Not regulated.

IMDG
Not regulated.
15. Regulatory information

US Federal Regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
None present or none present in regulated quantities.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories

- Acute (Immediate)
- Chronic (Delayed)
- Fire
- Reactive
- Pressure Generating

SARA 302 Extremely Hazardous Substance
None present or none present in regulated quantities.

SARA 304 Emergency Release Notification
None present or none present in regulated quantities.

SARA 311/312 Hazardous Chemical

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>Threshold Planning Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe₂O₃</td>
<td>500 lbs</td>
</tr>
</tbody>
</table>

SARA 313 (TRI Reporting)
None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
None present or none present in regulated quantities.

US State Regulations

US. California Proposition 65
No ingredient regulated by CA Prop 65 present.

US. New Jersey Worker and Community Right-to-Know Act
IRON OXIDE, Fe₂O₃ Listed

US. Massachusetts RTK - Substance List
IRON OXIDE, Fe₂O₃ Listed

US. Pennsylvania RTK - Hazardous Substances
IRON OXIDE, Fe₂O₃ Listed

US. Rhode Island RTK
No ingredient regulated by RI Right-to-Know Law present.
Inventory Status:

- **Australia AICS:** On or in compliance with the inventory
- **Canada DSL Inventory List:** On or in compliance with the inventory
- **EINECS, ELINCS or NLP:** On or in compliance with the inventory
- **Japan (ENCS) List:** On or in compliance with the inventory
- **China Inv. Existing Chemical Substances:** Not in compliance with the inventory.
- **Korea Existing Chemicals Inv. (KECI):** On or in compliance with the inventory
- **Canada NDSL Inventory:** Not in compliance with the inventory.
- **Philippines PICCS:** On or in compliance with the inventory
- **US TSCA Inventory:** On or in compliance with the inventory
- **New Zealand Inventory of Chemicals:** On or in compliance with the inventory
- **Japan ISHL Listing:** On or in compliance with the inventory
- **Japan Pharmacopoeia Listing:** Not in compliance with the inventory.

16. Other information, including date of preparation or last revision

**NFPA Hazard ID**

![NFPA Hazard Rating Diagram]

Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

**Issue Date:** 11-07-2014

**Revision Date:** No data available.

**Version #:** 1.2

**Further Information:** No data available.
Disclaimer: THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED “AS IS,” AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRINGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.