Material Safety Datasheet (MSDS) for Strontium Manganese Oxide (SMO)

SMO is composed of following oxides

- Strontium oxide (SrO)

- Manganese oxide
  o MnO
  o MnO₂
  o Mn₂O₃
  o Mn₃O₄

The MSDS for all the individual oxides is provided in this document.

Please turn to next page for individual MSDSs.
Section 1 - Product and Company Information

Product Name                  STRONTIUM OXIDE, 99.9%
Product Number                415138
Brand                         ALDRICH
Company                       Sigma-Aldrich
Address                       3050 Spruce Street
                                SAINT LOUIS MO 63103 US
Technical Phone:              800-325-5832
Fax:                          800-325-5052
Emergency Phone:             314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name                  CAS #                  SARA 313
STRONTIUM OXIDE                 1314-11-0              No

Formula                       SrO

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Corrosive.
Reacts violently with water. Causes burns.

HMIS RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 3
SPECIAL HAZARD(S): Water reactive

NFPA RATING
HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 3
SPECIAL HAZARD(S): Water reactive

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes.
Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Carbon dioxide. Dry chemical powder.
Unsuitable: Do not use water.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Store in a cool dry place. Handle and store under nitrogen.
Incompatible Materials: Do not allow contact with water

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering
controls. If the respirator is the sole means of protection, use a
full-face supplied air respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Discard contaminated
shoes. Wash thoroughly after handling.

Section 9 - Physical/Chemical Properties

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<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
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<tr>
<td>Solubility</td>
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<td></td>
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</tbody>
</table>

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Materials to Avoid: Water.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Nature of decomposition products
not known.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
**Skin Contact**: Causes burns.
**Skin Absorption**: May be harmful if absorbed through the skin.
**Eye Contact**: Causes burns.
**Inhalation**: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
**Ingestion**: May be harmful if swallowed.

**SIGNS AND SYMPTOMS OF EXPOSURE**
Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

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**Section 12 - Ecological Information**

No data available.

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**Section 13 - Disposal Considerations**

**APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION**
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

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**Section 14 - Transport Information**

**DOT**
- **Proper Shipping Name**: Corrosive solid, basic, inorganic, n.o.s.
- **UN#:** 3262
- **Class**: 8
- **Packing Group**: Packing Group II
- **Hazard Label**: Corrosive
- **PIH**: Not PIH

**IATA**
- **Proper Shipping Name**: Corrosive solid, basic, inorganic, n.o.s.
- **IATA UN Number**: 3262
- **Hazard Class**: 8
- **Packing Group**: II

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**Section 15 - Regulatory Information**

**EU ADDITIONAL CLASSIFICATION**
- **Symbol of Danger**: C
- **Indication of Danger**: Corrosive.
- **R**: 14-34
- **Risk Statements**: Reacts violently with water. Causes burns.
- **S**: 26-30-36/37
- **Safety Statements**: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Never add water to this product. Wear suitable protective clothing and gloves.
US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Corrosive.
Risk Statements: Reacts violently with water. Causes burns.
Safety Statements: Never add water to this product. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing and gloves.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: No

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
Copyright 2007 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.
Manganese Oxide MnO

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer/Supplier:

ESPI Metals

1050 Benson Way, Ashland, OR 97520

Toll Free (800) 638-2581 * Fax (541) 488-8313

E-Mail: sales@espimetals.com

Product Name: Manganese Oxide

Formula: MnO

CAS Number: 1344-43-0

II. HAZARDOUS INGREDIENTS

Hazardous Components: Manganese Oxide

Percent (%): 0-100

OSHA PEL: 5 mg (Mn)/m³

ACGIH TLV: 0.2 mg (Mn)/m³

HMIS Ratings:

Health: 1

Flammability: 0

Reactivity: 0

III. PHYSICAL DATA

Boiling Point: N/E

Melting Point: N/E
IV. FIRE AND EXPLOSION HAZARDS DATA

Flash Point: N/A
Autoignition Temperature: N/E
Flammable Limits: Upper: N/A   Lower: N/A
Extinguishing Media: Use suitable extinguishing media for surrounding material and type of fire.
Special Fire Fighting Procedures: Firefighters must wear full face, self contained breathing apparatus and full protective clothing to prevent contact with skin and eyes.
Unusual Fire & Explosion Hazards: None known

V. HEALTH HAZARD INFORMATION

Health Hazards:
To the best of our knowledge the chemical, physical and toxicological properties of manganese oxide have not been thoroughly investigated and recorded.

Some manganese compounds are experimental tumorigens. They can cause central nervous and pulmonary system damage by inhalation of fumes and dust. Very few poisonings have occurred from ingestion. Chronic manganese poisoning is a clearly characterized disease which results from inhalation of fumes or dusts of manganese. The central nervous system is the chief site of damage. Exposure to dusts and fumes can possibly increase the incidence of upper respiratory infections and pneumonia (Sax, Dangerous Properties of Industrial Materials).

Acute Effects:

Inhalation: May cause irritation of the respiratory tract and mucous membranes, increase the incidence of upper respiratory tract and pulmonary infections. May cause metal fume fever. May also cause emphysema and acute pulmonary edema.
Ingestion: Absorption of manganese compounds from the gastrointestinal tract is poor under normal conditions. May cause abdominal pain and nausea.
Skin: May cause irritation.
Eye: May cause irritation.

Chronic Effects:

Inhalation: May cause pulmonary pneumonitis, manganism (psychosis and neurological disorders affecting the central nervous system).
Ingestion: May cause manganism.
Skin: May cause dermatitis.
Eye: May cause conjunctivitis.

Target Organs: May affect the central nervous system, respiratory system, liver and reproductive system.

Medical Conditions Generally Aggravated By Exposure: Pre-existing respiratory disorders.

Carcinogenicity: NTP: No   IARC: No   OSHA: No
EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove victim to fresh air, keep warm and quiet, give oxygen if breathing is difficult and seek medical attention immediately.

INGESTION: Give 1-2 glasses of water or milk and induce vomiting; seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention.

EYE: Flush eyes with lukewarm water, lifting upper and lower eyelids, for at least 15 minutes. Seek medical attention.

VI. REACTIVITY DATA

Stability: Stable

Conditions to Avoid: No data

Incompatibility (Material to Avoid): Strong oxidizing agents

Hazardous Decomposition Products: Manganese fume

Hazardous Polymerization: Will not occur

VII. SPILL OR LEAK PROCEDURES

Steps to Be Taken in Case Material Is Released or Spilled: Wear appropriate respiratory and protective equipment specified in section VIII. Isolate spill area, provide ventilation. Sweep or vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust.

Waste Disposal Method: Dispose of in accordance with all Local, State and Federal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection: NIOSH-approved dust respirator.

Ventilation: Use local exhaust to maintain concentration at or below the PEL, TLV. Mechanical exhaust is not recommended.

Eye Protection: Safety glasses

Protective Gloves: Impervious gloves

Other Protective Clothing or Equipment: Protective gear suitable to prevent contamination.

IX. SPECIAL PRECAUTIONS

Precautions to Be Taken in Handling and Storage: Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Ensure good ventilation at the workplace.

Work Practices: Implement engineering and work practice controls to reduce and maintain concentration of exposure at low levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating and smoking. Do not blow dust off clothing or skin with compressed air. Maintain eyewash capable of sustained flushing, safety drench shower and facilities for washing.

TSCA Listed: Yes
DOT Regulations:

Hazard Class: None

The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI shall not be held liable for any damage resulting from handling or from contact with the above product.

Issued by: S. Dierks
Revised/Verified: August 2011
Manganese Oxide MnO₂

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer/Supplier:
ESPI Metals
1050 Benson Way, Ashland, OR 97520
Toll Free (800) 638-2581 * Fax (541) 488-8313
E-Mail: sales@espimetals.com

Product Name: Manganese Oxide (Manganese IV Oxide)
Formula: MnO₂
CAS Number: 1313-13-9

II. HAZARDOUS INGREDIENTS

Hazardous Components: Manganese Oxide
Percent (%): 0-100
OSHA PEL: 5 mg (Mn)/m³
ACGIH TLV: 0.2 mg (Mn)/m³
HMIS Ratings:
Health: 1
Flammability: 0
Reactivity: 2

III. PHYSICAL DATA

Boiling Point: N/E
Melting Point: 535 °C
Specific Gravity: 5.026 g/cc
Solubility in H₂O: Insoluble
Appearance and Odor: Black powder, no odor.

IV. FIRE AND EXPLOSION HAZARDS DATA
Flash Point: N/A
Autoignition Temperature: N/E
Flammable Limits: Upper: N/A  Lower: N/A
Extinguishing Media: Use suitable extinguishing media for surrounding material and type of fire.
Special Fire Fighting Procedures: Wear NIOSH/MSHA approved self contained breathing apparatus, protective clothing, boots and gloves. If without risk, remove material from fire area.
Unusual Fire & Explosion Hazards: This substance is an oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Promotes fire.

V. HEALTH HAZARD INFORMATION
Health Hazards:
To the best of our knowledge the chemical, physical and toxicological properties of manganese oxide have not been thoroughly investigated and recorded.

Some manganese compounds are experimental tumorigens. They can cause central nervous and pulmonary system damage by inhalation of fumes and dust. Very few poisonings have occurred from ingestion. Chronic manganese poisoning is a clearly characterized disease which results from inhalation of fumes or dusts of manganese. The central nervous system is the chief site of damage. Exposure to dusts and fumes can possibly increase the incidence of upper respiratory infections and pneumonia (Sax, Dangerous Properties of Industrial Materials).

Acute Effects:
Inhalation: May cause irritation of the respiratory tract and mucous membranes, increase the incidence of upper respiratory tract and pulmonary infections. May cause metal fume fever. May also cause emphysema and acute pulmonary edema.
Ingestion: Absorption of manganese compounds from the gastrointestinal tract is poor under normal conditions. May cause abdominal pain and nausea.
Skin: May cause irritation.
Eye: May cause irritation.

Chronic Effects:
Inhalation: May cause pulmonary pneumonitis, manganism (psychosis and neurological disorders effecting the central nervous system).
Ingestion: May cause manganism.
Skin: May cause dermatitis.
Eye: May cause conjunctivitis.
Target Organs: May affect the central nervous system, respiratory system, liver, reproductive system.
Carcinogenicity: NTP: No  IARC: No  OSHA: No

EMERGENCY AND FIRST AID PROCEDURES:
INHALATION: Remove victim to fresh air; keep warm and quiet; give oxygen if breathing is difficult and seek
medical attention immediately.

**INGESTION**: Give 1-2 glasses of water or milk and induce vomiting; seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

**SKIN**: Remove contaminated clothing; brush material off skin; wash affected area with soap and water. Seek medical attention.

**EYE**: Flush eyes with lukewarm water, lifting upper and lower eyelids, for at least 15 minutes. Seek medical attention.

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**VI. REACTIVITY DATA**

**Stability**: Stable

**Conditions to Avoid**: No data

**Incompatibility (Material to Avoid)**: Reducing agents, easily oxidized materials, organic materials, acids, aluminum powder, interhalogens.

**Hazardous Decomposition Products**: Toxic metal oxide fumes.

**Hazardous Polymerization**: Will not occur

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**VII. SPILL OR LEAK PROCEDURES**

**Steps to Be Taken in Case Material Is Released or Spilled**: Wear appropriate respiratory and protective equipment specified in section VIII. Isolate spill area, provide ventilation and extinguish sources of ignition. Scoop up or vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust. Use non-sparking tools.

**Waste Disposal Method**: Dispose of in accordance with Federal, State and Local regulations.

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**VIII. SPECIAL PROTECTION INFORMATION**

**Respiratory Protection**: NIOSH approved respirator.

**Ventilation**: Use local exhaust to maintain concentration at or below the PEL, TLV. Mechanical exhaust is not recommended.

**Eye Protection**: Safety glasses

**Protective Gloves**: Impervious gloves

**Other Protective Equipment**: Protective gear suitable to prevent contamination.

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**IX. SPECIAL PRECAUTIONS**

**Precautions to Be Taken in Handling and Storage**: Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Minimize dust generation and accumulation. Ensure good ventilation at the workplace.

**Work Practices**: Implement engineering and work practice controls to reduce and maintain concentration of exposure at low levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating and smoking. Do not blow dust off clothing or skin with compressed air. Maintain eyewash capable of sustained flushing, safety drench shower and facilities for washing.

**TSCA Listed**: Yes

**DOT Regulations**: 
Hazard Class: None

The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI shall not be held liable for any damage resulting from handling or from contact with the above product.

Issued By: S. Dierks
Revised/Verified: August 2011
Manganese Oxide Mn2O3

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer/Supplier:
ESPI Metals

1050 Benson Way, Ashland, OR 97520

Toll Free (800) 638-2581 * Fax (541) 488-8313

E-Mail: sales@espimetals.com

Product Name: Manganese Oxide (Manganese III Oxide)
Formula: Mn2O3
CAS Number: 1317-34-6

II. HAZARDOUS INGREDIENTS

Hazardous Components: Manganese Oxide
Percent (%): 0-100
OSHA PEL: 5 mg (Mn)/m³
ACGIH TLV: 0.2 mg (Mn)/m³

HMIS Ratings:
Health: 1
flammability: 0
reactivity: 0

III. PHYSICAL DATA

Boiling Point: N/E
Melting Point: N/E
**Specific Gravity:** 4.50 gm/cc  
**Solubility in H2O:** Insoluble  
**Appearance and Odor:** Black crystalline powder

### IV. FIRE AND EXPLOSION HAZARDS DATA

- **Flash Point:** N/A  
- **Autoignition Temperature:** N/A  
- **Flammable Limits:** Upper: N/A  
  Lower: N/A  
- **Extinguishing Media:** Use suitable extinguishing media for surrounding material and type of fire.  
- **Special Fire Fighting Procedures:** Firefighters must wear full face, self-contained breathing apparatus and full protective clothing to prevent contact with skin and eyes.  
- **Unusual Fire & Explosion Hazards:** May emit toxic fumes when heated to decomposition.

### V. HEALTH HAZARD INFORMATION

**Health Hazards:**
To the best of our knowledge the chemical, physical and toxicological properties of manganese oxide have not been thoroughly investigated and recorded.

Some manganese compounds are experimental tumorigens. They can cause central nervous and pulmonary system damage by inhalation of fumes and dust. Very few poisonings have occurred from ingestion. Chronic manganese poisoning is a clearly characterized disease which results from inhalation of fumes or dusts of manganese. The central nervous system is the chief site of damage. Exposure to dusts and fumes can possibly increase the incidence of upper respiratory infections and pneumonia (Sax, Dangerous Properties of Industrial Materials).

**Acute Effects:**

- **Inhalation:** May cause irritation of the respiratory tract and mucous membranes, increase the incidence of upper respiratory tract and pulmonary infections. May cause metal fume fever. May also cause emphysema and acute pulmonary edema.

- **Ingestion:** Absorption of manganese compounds from the gastrointestinal tract is poor under normal conditions. May cause abdominal pain and nausea.

- **Skin:** May cause irritation.

- **Eye:** May cause irritation.

**Chronic Effects:**

- **Inhalation:** May cause pulmonary pneumonitis, manganism (psychosis and neurological disorders effecting the central nervous system).

- **Ingestion:** None recorded.

- **Skin:** May cause dermatitis.

- **Eye:** May cause conjunctivitis.

**Target Organs:** May affect the central nervous system, respiratory system, liver and reproductive system.

**Carcinogenicity:** NTP: No  
IARC: No  
OSHA: No

### EMERGENCY AND FIRST AID PROCEDURES:

**INHALATION:** Remove victim to fresh air, keep warm and quiet, give oxygen if breathing is difficult and seek medical attention.
INGESTION: Give 1-2 glasses of water or milk and induce vomiting; seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. Seek medical attention.

EYE: Flush eyes with lukewarm water, lifting upper and lower eyelids, for at least 15 minutes. Seek medical attention.

VI. REACTIVITY DATA

Stability: Stable

Conditions to Avoid: No data

Incompatibility (Material to Avoid): Strong oxidizing agents.

Hazardous Decomposition Products: Manganese fume.

Hazardous Polymerization: Will not occur

VII. SPILL OR LEAK PROCEDURES

Steps to Be Taken in Case Material Is Released or Spilled: Wear appropriate respiratory and protective equipment specified in section VIII. Isolate spill area, provide ventilation and extinguish sources of ignition. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust. Use non-sparking tools.

Waste Disposal Method: Dispose of in accordance with Federal, State and Local regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection: NIOSH-approved dust respirator.

Ventilation: Use local exhaust to maintain concentration at or below the PEL, TLV. Mechanical exhaust is not recommended.

Eye Protection: Safety glasses

Protective Gloves: Impervious gloves.

Other Protective Clothing or Equipment: Protective gear suitable to prevent contamination.

IX. SPECIAL PRECAUTIONS

Precautions to Be Taken in Handling and Storage: Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Ensure good ventilation at the workplace.

Work Practices: Implement engineering and work practice controls to reduce and maintain concentration of exposure at low levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating and smoking. Do not blow dust off clothing or skin with compressed air. Maintain eyewash capable of sustained flushing, safety drench shower and facilities for washing.

TSCA Listed: Yes

DOT Regulations:

Hazard Class: None
The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI shall not be held liable for any damage resulting from handling or from contact with the above product.

Issued By: S. Dierks

Revised/Verified: August 2011
Manganese Oxide Mn₃O₄

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer/Supplier:
ESPI Metals
1050 Benson Way, Ashland, OR 97520
Toll Free (800) 638-2581 * Fax (541) 488-8313
E-Mail: sales@espimetals.com

Product Name: Manganese Oxide
Formula: Mn₃O₄ (plus MnO)
CAS Number: 1317-35-7

II. HAZARDOUS INGREDIENTS

Hazardous Components: Manganese Oxide
Percent (%): 0-100
OSHA PEL: 5 mg(Mn)/m³
ACGIH TLV: 0.2 mg(Mn)/m³

III. PHYSICAL DATA

Boiling Point: N/E
Melting Point: 1564 ºC
Specific Gravity: 4.856 g/cc
Solubility in H₂O: Insoluble
Appearance and Odor: Black crystalline powder and pieces, no odor.
IV. FIRE AND EXPLOSION HAZARDS DATA

Flash Point: N/A

Autoignition Temperature: N/E

Flammable Limits: Upper: N/A Lower: N/A

Extinguishing Media: Use suitable extinguishing media for surrounding material and type of fire.

Special Fire Fighting Procedures: Wear NIOSH/MSHA approved self contained breathing apparatus, protective clothing, boots and gloves. If without risk, remove material from fire area.

Unusual Fire & Explosion Hazards: When heated to decomposition this material may emit toxic fumes.

V. HEALTH HAZARD INFORMATION

Effects of Exposure:

To the best of our knowledge the chemical, physical and toxicological properties of manganese oxide have not been thoroughly investigated and reported.

Some manganese compounds are experimental tumorigens. They can cause central nervous system and pulmonary system damage by inhalation of fumes and dust. Very few poisonings have occurred from ingestion.

Chronic manganese poisoning is a clearly characterized disease which results from inhalation of fumes or dusts of manganese. The central nervous system is the chief site of damage. Exposure to dusts and fumes can possibly increase the incidence of upper respiratory infections and pneumonia (Sax, Dangerous Properties of Industrial Materials).

Acute Effects:

Inhalation: Inhalation of manganese compounds is considered the primary route of exposure, they may cause irritation of the respiratory tract and mucous membranes. Inhalation of manganese compounds' fine dusts and fumes may cause metal fume fever.

Ingestion: Absorption of manganese compounds from the gastrointestinal tract is poor under normal conditions.

Skin: Absorption by skin is poor.

Eye: May cause moderate irritation.

Chronic Effects:

Inhalation: Chronic inhalation of manganese compounds' dust particles, approximately 3 um in size, for a period of a few months may cause pulmonary pneumonitis. Manganese compounds may also cause manganism, psychic and neurological disorders affecting the central nervous system, to develop (not fatal but can cause permanent disability).

Ingestion: No chronic effects recorded.

Skin: No chronic effects recorded.

Eye: No chronic effects recorded.

Routes of Entry: Inhalation

Target Organs: May affect the central nervous system, kidneys, respiratory system and liver.

Medical Conditions Generally Aggravated By Exposure: It has been recorded that when exposed to manganese dust and fumes, there is a higher incidence of upper respiratory infection and pneumonia compared to general population.

Carcinogenicity: NTP: No IARC: No OSHA: No

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove victim to fresh air; keep warm and quiet; give oxygen if breathing is difficult and seek
medical attention immediately.

**INGESTION**: Give 1-2 glasses of water or milk and induce vomiting; seek medical attention. Never induce vomiting or give anything by mouth to an unconscious person.

**SKIN**: Remove contaminated clothing; brush material off skin; wash affected area with soap and water. Seek medical attention.

**EYE**: Flush eyes with lukewarm water, lifting upper and lower eyelids, for at least 15 minutes. Seek medical attention.

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**VI. REACTIVITY DATA**

**Stability**: Stable

**Conditions to Avoid**: None

**Incompatibility (Material to Avoid)**: Easily oxidized materials and reducing agents.

**Hazardous Decomposition Products**: Manganese oxide fume.

**Hazardous Polymerization**: Will not occur

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**VII. SPILL OR LEAK PROCEDURES**

**Steps to Be Taken in Case Material Is Released or Spilled**: Wear appropriate respiratory and protective equipment specified in section VIII. Isolate spill area, provide ventilation and extinguish sources of ignition. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Take care not to raise dust.

**Waste Disposal Method**: Dispose of in accordance with Local, State and Federal regulations.

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**VIII. SPECIAL PROTECTION INFORMATION**

**Respiratory Protection**: NIOSH approved dust respirator.

**Ventilation**: Use local exhaust to maintain concentration at or below the PEL, TLV. Mechanical exhaust is not recommended.

**Eye Protection**: Safety glasses

**Protective Gloves**: Rubber gloves

**Other Protective Equipment**: For long periods of exposure, wear protective clothing.

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**IX. SPECIAL PRECAUTIONS**

**Precautions to Be Taken in Handling and Storage**: Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Avoid breathing dust and use adequate ventilation. Store away from oxidizers. Wash thoroughly after handling.

**Work Practices**: Implement engineering and work practice controls to reduce and maintain concentration of exposure at low levels. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating and smoking. Do not blow dust off clothing or skin with compressed air. Maintain eyewash capable of sustained flushing, safety drench shower and facilities for washing.

**TSCA Listed**: Yes

**Dot Regulations**: None

**Hazard Class**: None
The above information is believed to be correct, but does not purport to be all inclusive and shall be used only as a guide. ESPI shall not be held liable for any damage resulting from handling or from contact with the above product.

Issued By: S. Dierks
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