PMO is composed of following oxides

- Praseodymium oxide (Pr$_6$O$_{11}$)

- Manganese oxide
  - MnO
  - MnO$_2$
  - Mn$_2$O$_3$
  - Mn$_3$O$_4$

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

Please turn to next page for individual MSDSs.
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: Praseodymium Oxide

Formula: Pr₆O₁₁

CAS Number: 12037-29-5

II. HAZARDOUS INGREDIENTS

Hazardous Component: Praseodymium Oxide

Percent (%): 0-100

OSHA/PEL: N/E

ACGIH/TLV: N/E

HMIS Ratings:
Health: 1
Flammability: 0
Reactivity: 0

III. PHYSICAL DATA

Boiling Point: 4200 °C
IV. FIRE AND EXPLOSION HAZARDS DATA

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

V. HEALTH HAZARD INFORMATION

Effects of Exposure:
To the best of our knowledge the chemical, physical and toxicological properties of praseodymium oxide have not been thoroughly investigated and recorded.
Praseodymium is considered a rare earth metal. These metals are moderately to highly toxic. The symptoms of toxicity of the rare earth elements include writhing, ataxia, labored respiration, walking on the toes with arched back, and sedation. The rare earth elements exhibit low toxicity by ingestion exposure. May lead to production of skin and lung granulomas.

Acute Effects:
Inhalation: May cause irritation to the upper respiratory system.
Ingestion: Considered to have low toxicity by ingestion.
Skin: May cause irritation.
Eye: May cause moderate irritation.

Chronic Effects:
Inhalation: May cause writhing, ataxia, labored respiration, sedation, pulmonary edema and lung granuloma.
Ingestion: May act as a blood anticoagulant.
Skin: No chronic health effects recorded.
Eye: No chronic health effects recorded.

Medical Conditions Possibly Aggravated by Overexposure: Pre-existing respiratory disorders
Carcinogenicity: NTP: No   IARC: No   OSHA: No

EMERGENCY AND FIRST AID PROCEDURES:
INHALATION: Remove to fresh air, keep warm and quiet, give oxygen if breathing is difficult and seek medical attention.
INGESTION: Give 1-2 glasses of milk or water 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 mild soap and water. Seek medical attention if irritation develops or persists.

EYE: Flush eyes with lukewarm water, including under upper and lower eyelids, for at least 15 minutes. Seek medical attention if irritation develops or persists.

VI. REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Water/moisture

Incompatibility (Material to Avoid): Acids, oxidizing agents

Hazardous Decomposition Products: None

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 and provide ventilation. Vacuum up spill using a high efficiency particulate absolute (HEPA) air filter and place in a closed container for proper disposal. Avoid creating dusting conditions.

Waste Disposal Method: Dispose of in accordance with local, state and federal waste disposal regulations.

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection: Use a NIOSH/MSHA approved dust respirator.

Ventilation: Use local exhaust to maintain concentration of exposure at low levels. General exhaust is recommended.

Protective Gloves: Rubber gloves

Eye Protection: Safety glasses

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

IX. SPECIAL PRECAUTIONS

Precautions to Be Taken in Handling and Storage: Store in tightly sealed container in a cool, dry area. This material is hygroscopic and will absorb moisture and CO₂. Keep container tightly sealed and protect from moisture and air. Wash thoroughly after handling

Other Precautions: Dry powders can build static electricity charges when subjected to the friction of conveying, mixing or sliding. To prevent ignition, provide adequate precautions, such as electrical grounding, or inert atmospheres when material is used in the presence of flammable materials.

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 damages resulting from handling or from contact with the above product.

Issued by: S. Dierks
Date: September 2010
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

What's New?

Need Indium Tomorrow?
Take advantage of "overnight" shipping for Indium by clicking: Indium Ready-To-Ship.

Precious Metal Prices

<table>
<thead>
<tr>
<th>Metal</th>
<th>Price Change</th>
<th>Price</th>
<th>Year Ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>-2.80</td>
<td>$1285.00</td>
<td>$1262.00</td>
</tr>
<tr>
<td>Silver</td>
<td>-0.14</td>
<td>$22.00</td>
<td>$22.14</td>
</tr>
<tr>
<td>Platinum</td>
<td>+0.00</td>
<td>$1447.00</td>
<td>$1447.00</td>
</tr>
<tr>
<td>Palladium</td>
<td>-7.00</td>
<td>$742.00</td>
<td>$750.00</td>
</tr>
</tbody>
</table>

Need Help?
Available Mon-Fri 8am to 5pm Pacific Time

Contact

ESPI Metals
1050 Benson Way
Ashland, Oregon 97520

541.488.8311 telephone
800.638.2581 toll-free
541.488.8313 fax
800.488.0060 toll-free fax
sales@espimetals.com

"Your high purity metal specialists"
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
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.

**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

**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.

**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.

**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 assistance.
**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**: 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
Manganous 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 °C
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.

---

**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

---

**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.

---

**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.

---

**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**:

**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: February 2012