

# MATERIAL SAFETY DATA SHEET

## MANGANESE DIOXIDE

AMERICAN MINERALS  
901 East Eighth Avenue - Suite 200  
King of Prussia, PA, 19406

**EMERGENCY PHONE NUMBERS:**  
**AM Health & Safety:** (610) 337-8030  
**CHEMTREC (24-hrs):** (800) 424-9300

### SECTION 1: PRODUCT AND COMPANY INFORMATION

HMIS (NPCA)	
HEALTH	2
FLAMMABILITY	0
REACTIVITY	1
PERSONAL PROTECTION	E

### MANGANESE DIOXIDE

PRODUCT ID: AM038  
PRODUCT NUMBER: N/A  
MSDS NUMBER: AMMNO2  
PREPARATION DATE: 12/1990  
REVISION DATE: 12/2000

**DESCRIPTION:** MANGANESE DIOXIDE (pyrolusite ore) is used for many industrial and chemical applications. It is the source of manganese and all its compounds; largely used in manufacture of manganese steel; oxidizer; in alkaline batteries; decolorizing glass; in ceramic bodies and glazes.

#### PRODUCT INFORMATION:

**CAS NUMBER:** Mixture. (For ingredient CAS numbers, see *SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS.*)

**SYNONYMS:** No product synonyms. (For ingredient synonyms, see *SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS.*)

### SECTION 2: COMPOSITION / INFORMATION ON INGREDIENTS

#### HAZARDOUS COMPONENTS PLUS OTHER SIGNIFICANT COMPONENTS:

COMPONENT	SYNONYMS AND TRADE NAMES	CAS #	% BY WT.
Pyrolusite (MnO <sub>2</sub> )	Manganese Dioxide; Manganese Black; Manganese (IV) Oxide; Peroxide; Manganese Superoxide;	1313-13-9	72-80
Nonhazardous Ingredients / Inert Materials / Proprietary	N/A	N/A	15-25
Quartz (SiO <sub>2</sub> )	Agate; Cristobalite; Crystallized Silicon Dioxide; Quartz Silica; Silica Dust; Silica Flour (Powdered Crystalline Silica); Silica, Crystalline Quartz; Tripoli;	14808-60-7	1-3
Barium Compounds (as Ba), comp. of Mn ore <sup>1</sup>	N/A	7440-39-3	1-2
Lead (Pb, inorganic compounds) <sup>1</sup>	Glover; Lead Flake; Lead Inorganic; Lead Metal; Plumbum	7439-92-1	0-0.2

#### NOTES:

1. These trace metals are not in the free metal form but exist as integral, inorganic, mineralogical constituents in the mineral ores.

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### SECTION 3: HAZARDS IDENTIFICATION

COMPONENT	CAS #	% BY WT.	OSHA PEL [mg/m <sup>3</sup> ]	OSHA CEILING [mg/m <sup>3</sup> ]	ACGIH TLV [mg/m <sup>3</sup> ]	ACGIH STEL [mg/m <sup>3</sup> ]	LISTED CARCINOGEN (YES/NO)		
							NTP	IARC	OSHA
Pyrolusite (MnO <sub>2</sub> )	1313-13-9	72-80	N/A	5 F (as Mn)	0.2 (as Mn)	N/A	NO	NO	NO
Nonhazardous Ingredients / Inert Materials / Proprietary	N/A	15-25	15 T; 5 R	N/A	10 T; 5 R	N/A	NO	NO	NO
Quartz (SiO <sub>2</sub> )	14808-60-7	1-3	10/(% SiO <sub>2</sub> +2)	N/A	0.05	N/A	YES <sup>2</sup>	YES <sup>3</sup>	NO
Barium Compounds (as Ba), comp. of Mn ore	7440-39-3	1-2	0.5 (as Ba)	N/A	0.5	N/A	NO	NO	NO
Lead (Pb, inorganic compounds)	7439-92-1	0-0.2	0.05	N/A	0.05	N/A	NO	NO	NO

**NOTES:**

T = Total dust; R = Respirable dust; F = Fume

1. Exposure limits listed for each ingredient is for exposure to dust that may be generated during product transfer and handling.
2. NTP Class 2A: Reasonably anticipated to be a carcinogen, limited evidence of carcinogenicity from studies in humans.
3. IARC Group 2A: Probably carcinogenic to humans.

**EMERGENCY OVERVIEW:** Not a fire or spill hazard. Low toxicity; dry dust is a nuisance particulate. Generally, health effects are provided for exposure to dust that may be generated during product transfer and handling.

**POTENTIAL HEALTH EFFECTS:**

**Primary Route of Exposure:** Inhalation

**Relevant Route(s) of Exposure**

**Eye Contact:** Contact with particulate may cause slight to moderate eye irritation. Abrasive action of dust particulate can damage eye.

**Skin Contact:** Prolonged or repeated contact may cause slight to moderate skin irritation.

**Inhalation:** Overexposure by inhalation of airborne particulate, dust, or fumes is irritating to the nose, throat, and respiratory tract. Inhalation of excessive levels of dust or fumes may be harmful.

**Ingestion:** Ingestion is an unlikely route of exposure; no hazard in normal industrial use. Small amounts (< tablespoonful) swallowed during normal handling operations are not likely to cause injury, however, swallowing larger amounts may cause injury. If ingested in sufficient quantity, may cause gastrointestinal disturbances. Symptoms may include irritation, nausea, vomiting, abdominal pain, and diarrhea.

**Target Organs:** Respiratory system, eyes.

**Acute Effects of Exposure:** Excessive, short-term exposure to airborne mineral dusts and particulate may cause upper respiratory and eye irritation. Exposure via inhalation to heavy concentrations of dusts containing manganese compounds for as little three months have effected the central nervous system.

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**Chronic Effects of Exposure:** Excessive, long-term inhalation of airborne mineral dusts and particulate may contribute to the development of bronchitis, reduced breathing capacity, and may lead to the increased susceptibility to lung disease. **Manganese poisoning:** The excessive, chronic inhalation of manganese compounds usually begins with complaints of languor and sleepiness. This is followed by weakness in the legs and the development of stolid, mask-like faces. The patient speaks with a slow monotonous voice. Then muscular twitching appear, varying from a fine tremor of the hands to coarse, rhythmical movements of the arms, legs, and trunk. There is a slight increase in tendon reflexes, ankle and patellar clonus, and a typical Parkinsonian slapping gate.

**Signs and Symptoms of Exposure:** (Dust) tearing of eyes, burning sensation in the throat, cough, chest discomfort.

**Medical Conditions Generally Known to be Aggravated by Exposure:** The excessive inhalation of mineral dust may aggravate pre-existing chronic lung conditions such as, but not limited to, bronchitis, emphysema, and asthma.

**Reproductive Hazards:** Not a reproductive hazard.

**POTENTIAL ENVIRONMENTAL EFFECTS:** Derived from natural ores; no adverse environmental effects known. However, prevent spilled product from entering streams, water bodies, and wastewater systems. This material is used as an agricultural product.

### SECTION 4: FIRST AID MEASURES

#### FIRST AID PROCEDURES:

**Eye Contact:** Remove material by immediately flushing eyes with clean, flowing, lukewarm water (low pressure) for at least 15 minutes. Get medical attention if pain or irritation persists.

**Skin Contact:** Immediately wash affected area with mild soap and water to remove any dust adhering to the skin. Get medical attention if irritation develops or persists.

**Inhalation:** If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop. If not breathing, give artificial respiration or give oxygen by trained personnel, and get medical attention.

**Ingestion:** Ingestion is an unlikely route of exposure. If ingested in sufficient quantity and victim is conscious, give 1-2 glasses of water or milk. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.

**NOTE TO PHYSICIANS:** None.

### SECTION 5: FIRE FIGHTING MEASURES

**FLAMMABLE PROPERTIES:** Material will not burn. Although not combustible, this material is a strong oxidizing agent, which liberates oxygen during thermal decomposition. It may increase the burning rate of combustibles with a flare-burning effect. It may cause reignition after a fire is extinguished.

**EXTINGUISHING MEDIA:** Use dry chemical or CO<sub>2</sub> to extinguish fires involving this material.

**PROTECTION FOR FIREFIGHTERS:** Material should be kept out of eyes and off skin. As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Do not release runoff from fire control methods to sewers or waterways.

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**SECTION 6: ACCIDENTAL RELEASE MEASURES**

**CONTAINMENT:** Product is dry solid (granular or powder) and not readily soluble in water. However, prevent spilled product from entering streams, water bodies, and wastewater systems.

**CLEANUP:** Vacuum or sweep up dry material and place in a container for reuse. Avoid creating excessive airborne dust. Cleanup personnel need to wear approved respiratory protection (air-purifying or air-supply), gloves, long sleeved clothing and goggles to prevent irritation from contact and inhalation.

**COLLECTION:** If possible, collect and reuse spilled product.

**REPORTING:** SEE SECTION 15: REGULATORY INFORMATION

**EVACUATION:** Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

**SECTION 7: HANDLING AND STORAGE**

**HANDLING:** Minimize dust generation and accumulation. Avoid breathing dust. Avoid contact with skin and eyes.

**STORAGE:** Store in a cool, dry area. Keep container closed when not in use. Product or component is a powerful oxidizer, hence it should not be stored near organic matter or other easily oxidizable substances, e.g., sulfur, sulfides, phosphides, hypophosphides, etc. or incompatible materials such as hydrogen peroxide and sodium peroxide.

**SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**

**ENGINEERING CONTROLS:** If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limits listed in SECTION 2.

**PERSONAL PROTECTIVE EQUIPMENT:**

**Eye & Face Protection:** Corrosive to eyes. Wear protective safety goggles when dust generation is likely.

**Skin Protection:** Wear clothing sufficient to cover the skin, safety shoes, and leather gloves for hand protection against dry material.

**Respiratory Protection:** Use NIOSH/MSHA approved respiratory protection (air purifying or air supplying) when concentrations are above exposure limit value. A respiratory protection program that meets OSHA 29 CFR part 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant the use of a respirator.

**General Hygiene Considerations:** Wash thoroughly after using product. Wash contaminated clothing. Wash hands before eating or drinking.

**EXPOSURE GUIDELINES:** See SECTION 2.

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### SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE:** Black to brownish black and available in various size ranges from granular to fine powders.

**ODOR:** Odorless.

#### PHYSICAL/CHEMICAL PROPERTIES:

<b>Bulk density:</b>	125 - 132 lbs/ft <sup>3</sup>	<b>Freeze Point:</b>	Solid at STP	<b>% volatile by vol:</b>	0% H <sub>2</sub> O
<b>Water solubility:</b>	Slight	<b>Melting Point:</b>	>2800 °F	<b>Vapor Density:</b>	N/A
<b>pH: (10% aqueous slurry)</b>	9 - 10	<b>Boiling Point:</b>	N/A	<b>Vapor Pressure:</b>	N/A

### SECTION 10: STABILITY AND REACTIVITY

**STABILITY:** Stable under normal conditions of storage.

**CONDITIONS TO AVOID:** None under normal conditions.

**MATERIALS TO AVOID:** Pyrolusite (MnO<sub>2</sub>) is a powerful oxidizer, hence it should not be heated or rubbed with organic matter or other easily oxidizable substances, e.g., sulfur, sulfides, phosphides, hypophosphides, etc. Material is flammable by chemical reaction. Incompatible with hydrogen peroxide and sodium peroxide. Keep away from heat and flammable materials.

**HAZARDOUS DECOMPOSITION PRODUCTS:** None under normal conditions.

**HAZARDOUS POLYMERIZATION:** Will not occur.

### SECTION 11: TOXICOLOGICAL PROPERTIES

#### RTECS TOXICITY DATA FOR PRODUCT COMPONENTS:

COMPONENT	CAS #	RTECS TOXICITY DATA
Pyrolusite (MnO <sub>2</sub> )	1313-13-9	<b>Acute Dermal:</b> Mouse LD 50 Route: Subcutaneous Dose: 422 mg/kg. <b>Chronic (Multiple Dose) Inhalation:</b> Rat Dose: 1800 ug/m <sup>3</sup> /24H/35D-C; Toxic Effects: Brain and coverings - Recordings from specific areas of CNS; Blood - Changes in serum composition; Biochemical - True cholinesterase. <b>Reproductive/Teratogenic:</b> Mouse Route: Inhalation; Dose: 49 mg/m <sup>3</sup> /7H; Duration: female 75D prior to mating Effects on Newborn - Growth statistics; Behavioral.
Nonhazardous Ingredients / Inert Materials / Proprietary	N/A	N/A

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### RTECS TOXICITY DATA FOR PRODUCT COMPONENTS (continued):

Quartz (SiO <sub>2</sub> )	14808-60-7	<p><b>Acute Inhalation:</b> Human LC Lo Dose: 300 ug/m<sup>3</sup>/10Y-I; Toxic Effects: Liver - Other changes. Human TC Lo Dose: 16 mppcf/8H/17.9Y-I; Toxic Effects: Lungs, Thorax, or Respiration -Fibrosis, focal (pneumoconiosis); Lungs, Thorax, or Respiration - Cough; Lungs, Thorax, or Respiration - Dyspnea.</p> <p><b>Chronic (Multiple Dose) Inhalation:</b> Rat Dose: 80 mg/m<sup>3</sup>/26W-I; Toxic Effects: Lungs, Thorax, or Respiration - Fibrosis, focal (pneumoconiosis); Blood - Changes in spleen. Rat Dose: 108mg/m<sup>3</sup>/6H/3D-I; Toxic Effects: Biochemical - Phosphatases; Biochemical - Other oxidoreductases; Biochemical - Other proteins. Rat Dose: 58 mg/m<sup>3</sup>/13W-I; Toxic Effects: Lungs, Thorax, or Respiration - Other changes; Endocrine - Changes in thymus weight; Blood -Changes in leukocyte (WBC) cell count. Rat Dose: 1475 ug/m<sup>3</sup>/8H/21W-I; Toxic Effects: Lungs, Thorax, or Respiration - Other changes. Rat Dose: 4932 ug/m<sup>3</sup>/24H/39W-C; Toxic Effects: Endocrine - Changes in spleen weight; Immunological including allergic - Decrease in humoral Immune response. Rat Dose: 28 mg/m<sup>3</sup>/3W-I; Toxic Effects: Lungs, Thorax, or Respiration -Otherchanges; Lungs, Thorax, or Respiration - Changes in lung weight; Biochemical - Other enzymes.</p> <p><b>Mutagenic:</b> Human Micronucleus Test; Cell Type: lung; Dose: 40 ug/cm<sup>2</sup>. Hamster Micronucleus Test; Cell Type: lung; Dose: 160 ug/cm<sup>2</sup>.</p> <p><b>Tumorigenic:</b> Rat Route: Inhalation; Dose: 50 mg/m<sup>3</sup>/6H/71W-I; Toxic Effects: Tumorigenic -Carcinogenic by RTECS criteria; Liver - Tumors. Rat Route: Intravenous; Dose: 90 mg/kg; Toxic Effects: Tumorigenic - Equivocal tumorigenic agent by RTECS criteria; Blood -Lymphomax including Hodgkin's disease.</p>
Barium Compounds (as Ba), comp. of Mn ore	7440-39-3	<b>NO RTECS TOXICITY DATA AVAILABLE.</b>
Lead (Pb, inorganic compounds)	7439-92-1	<p><b>Acute Oral:</b> Woman TD Lo Dose: 450 mg/kg/6Y; Toxic Effects: Peripheral nerve and sensation -Flaccid paralysis without anesthesia; Behavioral - Hallucinations, distorted perceptions; Behavioral - Muscle weakness. Pigeon LD Lo Dose: 160 mg/kg.</p> <p><b>Acute Inhalation:</b> Human TC Lo Dose: 10 ug/m<sup>3</sup>; Toxic Effects: Gastrointestinal - Gastritis; Liver -Other changes.</p> <p><b>Reproductive/Teratogenic:</b> Rat Route: Oral; Dose: 790 mg/kg; Duration: multigenerations; Effects on Embryo or Fetus - Fetotoxicity; Fetal death. Rat Route: Oral; Dose: 1140 mg/kg; Duration: female 14D prior to mating Effects on Newborn - Behavioral. Rat Route: Oral; Dose: 520 mg/kg; Duration: female 7-22D of pregnancy; Effects on Newborn - Biochemical and metabolic. Rat Route: Oral; Dose: 1100 mg/kg; Duration: female 1-22D of pregnancy; Specific Developmental Abnormalities - Blood and lymphatic systems (including spleen and marrow); Effects on Newborn - Growth statistics. Rat Route: Inhalation; Dose: 10 mg/m<sup>3</sup> /24H Duration: female 1-21D of pregnancy; Effects on Embryo or Fetus - Fetotoxicity; Specific Developmental Abnormalities - Blood and lymphatic systems (including spleen and marrow). Rat Route: Inhalation; Dose: 3 mg/m<sup>3</sup>/24H; Duration: female 1-21D of pregnancy; Effects on Newborn - Biochemical and metabolic.</p> <p><b>Mutagenic:</b> Human Cytogenetic Analysis; Route: Unreported; Dose: 50 ug/m<sup>3</sup>. Monkey Cytogenetic Analysis; Route: Oral; Dose: 42 mg/kg/30W.</p>

### SECTION 12: ECOLOGICAL INFORMATION

Derived from mineral ores. No data available on any adverse effects of this material on the environment.

### SECTION 13: DISPOSAL CONSIDERATIONS

**RCRA:** This product, as manufactured, is not a RCRA listed hazardous waste and does not exhibit any characteristics of a hazardous waste, including toxicity (by EPA TCLP method.)

**DISPOSAL METHOD:** This product is generally suitable for landfill disposal. Follow all applicable Federal, State, and local laws, rules, and regulations regarding the proper disposal of this material. If this product has been altered or contaminated with other hazardous materials, appropriate waste analysis may be necessary to determine proper method for disposal. A qualified environmental professional should determine waste characterization, disposal, and treatment methods for this material in accordance with applicable Federal, State and local regulations and requirements.

----- MSDS CONTINUED ON NEXT PAGE -----

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### SECTION 14: TRANSPORTATION INFORMATION

**USDOT INFORMATION:** This product is not regulated by USDOT as a hazardous material (49 CFR part 172.101). No UN code assigned. No placard required for transportation.

#### LABEL:

##### CAUTION!

Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling and use. Keep in a closed container in a well-ventilated area.

##### FIRST AID MEASURES:

**Eye Contact:** Remove material by immediately flushing eyes with clean, flowing, lukewarm water (low pressure) for at least 15 minutes. Get medical attention if pain or irritation persists.

**Skin Contact:** Immediately wash affected area with mild soap and water to remove any dust adhering to the skin. Get medical attention if irritation develops or persists.

**Inhalation:** If exposed to excessive levels of dusts or fumes, remove to fresh air and get medical attention if cough or other symptoms develop. If not breathing, give artificial respiration or give oxygen by trained personnel, and get medical attention.

**Ingestion:** Ingestion is an unlikely route of exposure. If ingested in sufficient quantity and victim is conscious, give 1-2 glasses of water or milk. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.

### SECTION 15: REGULATORY INFORMATION

#### COMPONENTS LISTED IN FEDERAL REGULATIONS AND STATE "RIGHT-TO-KNOW" LAWS:

COMPONENT	CAS #	FEDERAL					STATE (Right-to-Know)			
		RCRA	CERCLA	SARA	SARA EHS	TSCA	PA	NJ	MA	CA
Pyrolusite (MnO <sub>2</sub> )	1313-13-9	NO	YES <sup>1</sup>	YES <sup>3</sup>	NO	YES	NO	NO	NO	NO
Nonhazardous Ingredients / Inert Materials / Proprietary	N/A	NO	NO	NO	NO	NO	NO	NO	NO	NO
Quartz (SiO <sub>2</sub> )	14808-60-7	NO	NO	NO	NO	YES	YES	NO	YES	NO
Barium Compounds (as Ba), comp. of Mn ore	7440-39-3	NO	NO	YES	NO	YES	YES	YES	YES	NO
Lead (Pb, inorganic compounds)	7439-92-1	NO	YES <sup>2</sup>	YES	NO	YES	YES	YES	YES	YES

#### NOTES:

- Listed as Compound per CAA Section 112
- Listed per CWA Section 307(a) RQ: 10 lb (4.535 kg)
- Listed as compound

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**SECTION 16: OTHER INFORMATION****HAZARDOUS MATERIALS IDENTIFICATION SYSTEM of the National Paint & Coatings Association****HEALTH**

- 0 - Normal Material
- 1 - Slightly Hazardous/Significant irritation
- 2 - Hazardous/Temporary incapacitation or residual injury
- 3 - Extreme Danger/Serious or permanent injury
- 4 - Deadly

**REACTIVITY**

- 0 - Stable
- 1 - Unstable under heat or pressure
- 2 - Violent chemical change under heat or pressure
- 3 - Shock and heat may detonate
- 4 - Capable of Detonation or Explosion

**FLAMMABILITY**

- 0 - Will not burn
- 1 - Must be preheated before ignition will occur (Flash point greater than 200°F)
- 2 - Must be moderately heated before ignition will occur (Flash point 100°F to 200°F)
- 3 - Can be ignited under almost all ambient temperatures (Flash point 73°F to 100°F)
- 4 - Will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature, or will burn readily when dispersed in air (Flash point below 73°F)

**PERSONAL PROTECTION**

- A - Safety Glasses
- B - Safety Glasses + Gloves
- C - Safety Glasses + Gloves + Apron
- D - Face Shield + Gloves + Apron
- E - Safety Glasses + Gloves + Dust Respirator
- F - Safety Glasses + Gloves + Apron + Dust Respirator
- G - Safety Glasses + Gloves + Vapor Respirator
- H - Splash Goggles + Gloves + Apron + Vapor Respirator
- I - Safety Glasses + Gloves + Dust and Vapor Respirator
- J - Splash Goggles + Gloves + Apron + Dust and Vapor Respirator
- K - Air Line Hood or Mask + Gloves + Full Suit Boots
- X - Ask supervisor or safety specialist for handling instructions.