

Material Safety Data Sheet

JUL 01 1998

AMERICAN MINERALS
 901 EAST EIGHTH AVENUE
 SUITE 200
 KING OF PRUSSIA, PA 19406

PRODUCT: MANGANESE DIOXIDE
 Internal ID: AM038
 MSDS: AMMNO2
 Date Prepared: 12/90
 Revision Date: 11/97

Phone: HEALTH AND SAFETY: 610/337-1100
 CHEMTRAC, EMERGENCY ASSISTANCE: 1-800-424-9300

National Paint and Coatings Association
 Hazardous Material Identification System

HEALTH HAZARD	2 - Moderate Hazard
FLAMMABILITY HAZARD	0 - Minimal Hazard
REACTIVITY HAZARD	1 - Slight
PERSONAL PROTECTION	B - Glasses & Gloves

SECTION I. MATERIAL IDENTIFICATION

Product Name(s): Manganese dioxide, MnO₂, Pyrolusite

Description: Pyrolusite ore (manganese dioxide) 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.

CAS#: 1313-13-9

Manufacturer: American Minerals

Phone: 610/337-1100

SECTION II. INGREDIENTS AND HAZARDS

Ingredient Name:	CAS Number:	Percent:	Exposure Limits:
Pyrolusite (MnO ₂)	1313-13-9	72-80	For Manganese Dust, as Mn, and compounds CAS#7439-96-5 ACGIH TLV:TWA 2 mg(Mn)/m ³ ; Mn fume: 1mg/m ³ . OSHA PEL:TWA: 5mg(Mn)/m ³ .
Quartz(*) (SiO ₂)	14808-60-7	1-3	ACGIH TLV:TWA for respirable quartz: 0.10mg/m ³ .
Barium, Component of Mn Ore	7440-39-3	1-2	ACGIH TWA:is 0.5mg/m ³ as /Ba/. OSHA PEL:TWA 0.5mg/m ³ . as /Ba/.
Nonhazardous Ingredients (Nuisance Particulate)	-----	15-25	Nuisance Particulate Not Otherwise Regulated: OSHA PEL: TWA, Total Dust: 15mg/m ³ ; Respirable Dust: 5mg/m ³ . ACGIH TLV:TWA Total Dust 10mg/m ³ ; Respirable Dust: 5mg/m ³ .

The product may contain a trace of lead which exists as an integral, complex mineralogical constituent of the manganese ore. The lead (0.0 - 0.2%) (Inorganic) CAS#7439-92-1 listed by IARC: Possible human carcinogen (Group 2B); human evidence is inadequate; animal evidence is sufficient. The OSHA PEL:TWA for lead is 0.05mg/m³. A substance specific standard applies (see 29 CFR 1910.1025).

(*) A polymorph of crystalline silica. Identified by IARC as a known human carcinogen Group 1. NTP lists respirable quartz amongst substances which may "reasonably be anticipated to be carcinogens".

AMERICAN MINERALS
901 EAST EIGHTH AVENUE
SUITE 200
KING OF PRUSSIA, PA 19406

PRODUCT: MANGANESE DIOXIDE

Internal ID: AM038
MSDS: AMMNO2
Date Prepared: 12/90
Revision Date: 11/97

Phone: HEALTH AND SAFETY: 610/337-1100
CHEMTRAC, EMERGENCY ASSISTANCE: 1-800-424-9300

SECTION III. PHYSICAL DATA

Appearance and Odor: Black to brownish black and available in various size ranges from granular to fine powders; odorless.

Bulk Density: 125 - 132 lbs/cu.ft. (=17 lbs/gal) **Melting Point:** >2800°F
Water Solubility (%): slight **% volatile by volume:** 0
pH (10% Aqueous Slurry): 9 - 10

SECTION IV. FIRE AND EXPLOSION DATA

Extinguishing Media: Use dry chemical or CO₂ on fires involving Manganese dioxide.
Unusual fire or explosion hazards: Although not combustible, manganese dioxide is a strong oxidizing agent. It may increase the burning rate of combustibles with a flare-burning effect. It may cause reignition after a fire is extinguished. Oxygen from the thermal decomposition of MnO₂ facilitates combustion.
Special Fire-Fighting Procedures: Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with full facepiece operated in the pressure-demand or positive-pressure mode. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

SECTION V. REACTIVITY DATA

Stability: This product is a stable at room temperature in closed containers under normal conditions of storage and handling conditions. Hazardous polymerization will not occur.
Chemical incompatibilities: Manganese dioxide 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.. Flammable by chemical reaction. Incompatible with hydrogen peroxide; sodium peroxide. Keep away from heat and flammable materials.

SECTION VI. HEALTH HAZARD INFORMATION

Carcinogenicity: NTP, IARC, AND OSHA do not list manganese dioxide as a carcinogen.
Summary of risks: Manganese is an essential trace element for living organisms. Although found in all human tissue, acute or chronic manganese poisoning can occur from excessive intake via inhalation or ingestion. Manganese dioxide dust inhalation can irritate the respiratory tract and lead to lung damage, pleuritis, bronchitis, and increased incidence of respiratory infection. Large inhaled particles may be cleared from the respiratory tract and swallowed, but small particles are eventually absorbed into the blood.
Medical conditions which may be aggravated by contact: Lungs; central nervous system diseases, psychiatric disorders, eyes.
Target organs: Respiratory system, central nervous system.
Primary entry route: Inhalation, Ingestion
Acute Effects: Exposure to high concentrations of manganese dioxide causes an influenza-like illness (metal fume fever). The 24 to 48 hour illness is characterized by chills, fever, aching muscles, dryness in the mouth and throat, and headache. Manganese dust and fumes are minor irritants to the eyes and completely innocuous to the intact skin. Manganese pleuritis, bronchitis, or pneumonia may also occur.
Chronic Effects: Prolonged excessive inhalation can bring manganese into the body via both the lungs and digestive tract (swallowed mucous) to cause systemic poisoning. Chronic poisoning is usually in 6 to 24 month. Symptoms include apathy, anorexia, headache, weakness, and easy fatigue, then clumsiness, speech problems and other central nervous system effects. Progressive and permanent disability can result from chronic untreated manganese poisoning, but it is not fatal.

MATERIAL SAFETY DATA SHEET

AMERICAN MINERALS
901 EAST EIGHTH AVENUE
SUITE 200
KING OF PRUSSIA, PA 19406

PRODUCT: MANGANESE DIOXIDE

Internal ID: AM038
MSDS: AMMNO2
Date Prepared: 12/90
Revision Date: 11/97

Phone: HEALTH AND SAFETY: 610/337-1100
CHEMTRAC, EMERGENCY ASSISTANCE: 1-800-424-9300

HEALTH HAZARD INFORMATION continued from page 2

Signs & symptoms of overexposure:

Eye contact: Physical Irritation

Skin contact: Possible irritation from repeated or prolonged contact to individuals sensitive to mineral dust.

Inhalation: Throat and Upper respiratory irritation.

First aid:

Eye contact: Flush eyes, including under the eyelids, with large amounts of water. If irritation persists, seek medical attention.

Skin contact: Wash affected area with mild soap and water to remove any dust and manganese dioxide adhering to the skin.

Inhalation: Remove exposed person to fresh air. Support breathing as needed.

Ingestion: If ingested, have victim drink 2 - 3 glasses of water, then induce vomiting, then seek medical attention.

SECTION VII. SPILL, LEAK AND DISPOSAL PROCEDURES

Spill / Leak procedures: The product is not readily soluble, however prevent the spill from entering water and waste water systems. Cleanup personnel need to wear approved respiratory protection, gloves, long sleeved clothing and goggles to prevent irritation from contact and inhalation. Reuse all spilled material whenever possible.

Waste management/Disposal: The product is not a listed hazardous waste and does not exhibit any characteristics of a hazardous waste, including the EPA's TCLP for toxic characteristics. Follow all local, state and federal regulations for proper disposal.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Personal protective equipment: The use of safety glasses, gloves, and long sleeve clothing is recommended. The use of OSHA approved particulate dust respirator in accordance with 29 CFR 1910.134 must be worn for dust exposure above allowable exposure limits.

Hygienic Practices: Avoid contact with skin, eyes and clothing. After handling this product, wash hands before eating or drinking.

SPECIAL PROTECTION INFORMATION continued from page 3

Workplace Considerations:

Ventilation: If airborne contaminants are generated during material handling, provide general ventilation and local ventilation in sufficient volume and air flow patterns to control air contaminant concentration levels below allowable exposure limits.

SECTION IX. REGULATORY INFORMATION AND SPECIAL PRECAUTIONS

The product contains 72-80% Manganese dioxide (MnO_2) CAS#1313-13-9. Manganese dioxide is not specifically listed on any Federal regulatory lists, however Manganese compounds, as /Mn/ CAS# 7439-96-5 are listed, and manganese dioxide falls into this classification. Manganese compounds, as /Mn/ CAS# 7439-96-5 are regulated under requirements of SARA TITLE III Section 313.

The product contains 1-2% Barium. Barium compounds are listed under the EPA: EPCRA section 313; de minimis concentration is 1 percent.

The product contains 0.0 - 0.2% lead CAS#7439-92-1. The lead is in the form of an inorganic lead compound. The EPA CERCLA RQ for lead is 1 pound. EPCRA section 313 de minimis concentration is 0.1%, and so it is reportable under SARA Section 313.

MATERIAL SAFETY DATA SHEET

AMERICAN MINERALS
901 EAST EIGHTH AVENUE
SUITE 200
KING OF PRUSSIA, PA 19406

PRODUCT: MANGANESE DIOXIDE

Internal ID: AM038
MSDS: AMMNO2
Date Prepared: 12/90
Revision Date: 11/97

Phone: HEALTH AND SAFETY: 610/337-1100
CHEMTRAC, EMERGENCY ASSISTANCE: 1-800-424-9300

SECTION IX. REGULATORY INFORMATION AND SPECIAL PRECAUTIONS continued from page 3

Lead is listed under the following regulatory lists: Clean Water Act Sections 304 & 307, Safe Drinking Water Act Maximum Contaminant Level Substances & Statutory Contaminants, Clean Air Act Section 112, NIOSH Recommendation Substances, RCRA Hazardous Substances & Hazardous Constituents for Groundwater Monitoring, CERCLA Hazardous Substances, SARA Title III Sections 302 and 313, OSHA Air Contaminants & Specifically Regulated Substances, and the Massachusetts, New Jersey and Pennsylvania state lists.

Storage Requirements: Store in closed containers in a cool, dry, well-ventilated area away from sources of heat and ignition. Protect containers from physical damage. Since manganese dioxide is a strong oxidizer, store separately from organic and other oxidizable materials.

TSCA INVENTORY: All substances contained in the product are listed in the Chemical Substance Inventory of the Toxic Substances Control Act.

DOT Class: Not Regulated

SECTION X. REFERENCES

- Sax, N. Irving: Dangerous Properties of Industrial Materials, Ninth Edition, Van Nostrand Reinhold Co., Inc., 1996.
- Kirk, R. and Othmer, D., Encyclopedia of Chemical Technology, Third Edition, Wiley-Interscience, New York, NY 1982.
- Clansky, K.B., Suspect Chemicals Sourcebook, 1992-2 Edition, Roytech Publications, Bethesda, Maryland.
- Sax, N. Irving and Lewis, R.J. Hawley's Condensed Chemical Dictionary, Eleventh Ed., Van Nostrand Reinhold Co., Inc., NY
- Manufacturers/Suppliers, Material Safety Data Sheets on Raw Materials Used

SECTION XI. ACRONYMS/DEFINITIONS USED IN THIS MSDS

ACRONYMS AND REFERENCES USED IN PREPARATION OF MSDS':

ACGIH: American Conference of Governmental Industrial Hygienists
CAS#: CAS Registration Number is an assigned number to identify a material. CAS stands for Chemical Abstracts Service.

CERCLA: Comprehensive Environmental Response, Compensation & Liability Act
EPCRA: Emergency Planning and Community Right-to-Know Act of 1986
HMIS: Hazardous Materials Identification System (National Paint & Coatings Association)

IARC: International Agency for Research on Cancer
MSHA: Mine Safety and Health Administration
mg/m³: Milligrams per cubic meter

NIOSH: National Institute for Occupational Safety and Health
NFPA: National Fire Protection Association
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
PEL: Permissible Exposure Limit (OSHA)
REL: Recommended Exposure Limit (NIOSH)
SARA: Superfund Amendments and Reauthorization Act
TITLE III: Emergency Planning and Community Right To Know Act
Section 302: Extremely Hazardous Substances
Section 304: Emergency Release
Section 311: Community Right-to-Know, MSDSs or List of Chemicals
Section 312: Community Right-to-Know, Inventories & Locations, (Tier I/II)
Section 313: Toxic Chemicals, Toxic Chemical Release Reporting, Form R

TLV: Threshold Limit Values (ACGIH)
TWA: Time Weighted Average
29CFR1910.134: OSHA Respiratory Protection Standard