

Safety Data Sheet: Ceramic Grade Manganese Dioxide (MnO₂)

1. Identification

1.1 Product Identifier

Product Name: Ceramic Grade Manganese Dioxide (MnO₂) **Chemical Name:** Manganese Dioxide **Synonyms:** Manganese(IV) oxide, Pyrolusite, Black manganese oxide **CAS No.:** 1313-13-9 **EC No.:** 215-202-6

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified Uses: Ceramic colorant, body stains, glaze pigments, industrial applications requiring manganese hues. **Uses Advised Against:** Not for human consumption. Avoid uncontrolled release into the environment.

1.3 Details of the supplier of the safety data sheet

Supplier Name: BTLnewmaterial **Address:** Room 706, No. 154, Wuyi East Road, Niezhou Residential Committee, Caizichi Sub-district Office, Leiyang City, Hengyang City, Hunan Province, China **Email:** lixifirm@outlook.com **Phone/WhatsApp:** +8618273793022 **Website:** manganesesupply.com

1.4 Emergency telephone number

Emergency Phone: +8618273793022 (General)

2. Hazard(s) Identification

2.1 Classification of the substance or mixture

GHS Classification (Globally Harmonized System):

- Oxidizing Solids, Category 2 (H272) - May intensify fire; oxidizer.
- Specific Target Organ Toxicity - Repeated Exposure, Category 2 (H373) - May cause damage to organs (lungs, central nervous system) through prolonged or repeated exposure (inhalation).

2.2 GHS Label elements, including precautionary statements

Pictograms:

- Flame (GHS03)
- Health Hazard (GHS08)

Signal Word: Danger

Hazard Statements:

- H272: May intensify fire; oxidizer.
- H373: May cause damage to organs (lungs, central nervous system) through prolonged or repeated exposure (inhalation).

Precautionary Statements: Prevention:

- P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P220: Keep away from clothing and other combustible materials.
- P260: Do not breathe dust/fume/gas/mist/vapours/spray.
- P270: Do not eat, drink or smoke when using this product.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response:

- P308 + P313: IF exposed or concerned: Get medical advice/attention.

- P370 + P378: In case of fire: Use water spray, foam, dry chemical or carbon dioxide to extinguish.

Storage:

- P403 + P233: Store in a well-ventilated place. Keep container tightly closed.

Disposal:

- P501: Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other hazards which do not result in classification

Fine dust may cause mechanical irritation to eyes and respiratory tract. Ingestion of large amounts may cause gastrointestinal irritation.

3. Composition/Information on Ingredients

3.1 Substances

Chemical Name: Manganese Dioxide **Common Name/Synonyms:** Manganese(IV) oxide, Pyrolusite **CAS No.:** 1313-13-9 **EC No.:** 215-202-6 **Concentration:** 98.0–99.5% (Ceramic Grade MnO₂)

Impurities and Stabilizing Additives:

| Component | Concentration (Typical) |
|----------------------------------------------|-------------------------|
| Iron Oxide (Fe ₂ O ₃) | ≤ 0.20% |
| Silica (SiO ₂) | ≤ 0.50% |
| Loss on Ignition (LOI) | 0.5–1.5% |

4. First-Aid Measures

4.1 Description of first aid measures

General Advice: Consult a physician. Show this safety data sheet to the doctor in attendance.

If Inhaled: If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In Case of Skin Contact: Wash off with soap and plenty of water. Consult a physician if irritation develops or persists.

In Case of Eye Contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If Swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

Acute: May cause irritation to eyes, skin, and respiratory tract. Ingestion may cause gastrointestinal upset. **Delayed:** Prolonged or repeated inhalation of manganese dust may lead to manganism, a neurological disorder resembling Parkinson's disease, affecting the central nervous system. Symptoms include tremors, difficulty walking, and psychological disturbances. Chronic exposure can also cause lung damage.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically and supportively. Specific treatment for manganism may involve chelation therapy.

5. Fire-Fighting Measures

5.1 Extinguishing media

Suitable Extinguishing Media: Use water spray, foam, dry chemical, or carbon dioxide. Product is an oxidizer, so avoid using extinguishing agents that are incompatible with oxidizers.

Unsuitable Extinguishing Media: Do not use a solid water stream as it may spread the fire.

5.2 Special hazards arising from the substance or mixture

Hazardous Combustion Products: Manganese oxides, oxygen (supports combustion).

Specific Hazards: As an oxidizer, it can intensify fire of combustible materials. Contact with strong reducing agents may cause violent reactions.

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment. Fight fire from a safe distance.

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.

6.2 Environmental precautions

Do not let product enter drains. Prevent further leakage or spillage if safe to do so. Do not contaminate water sources or sewers.

6.3 Methods and materials for containment and cleaning up

Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal. Clean contaminated surfaces thoroughly.

7. Handling and Storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from sources of ignition - No smoking. Keep away from combustible material. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Store in a cool, dry, well-ventilated area. Keep container tightly closed. Store away from incompatible materials (e.g., strong reducing agents, combustible materials, acids). Protect from moisture.

8. Exposure Controls/Personal Protection

8.1 Control parameters

Occupational Exposure Limits (OELs):

- **Manganese (as Mn):**
 - **OSHA PEL (Permissible Exposure Limit):** 5 mg/m³ (ceiling)
 - **ACGIH TLV (Threshold Limit Value):** 0.02 mg/m³ (respirable fraction), 0.1 mg/m³ (inhalable fraction) - for manganese and inorganic manganese compounds.
 - **NIOSH REL (Recommended Exposure Limit):** 1 mg/m³ (TWA), 3 mg/m³ (STEL) - for manganese compounds.

8.2 Exposure controls

Appropriate Engineering Controls: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Use local exhaust ventilation to keep airborne concentrations below the occupational exposure limits.

Personal Protective Equipment (PPE):

- **Eye/Face Protection:** Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
- **Skin Protection:** Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands. Recommended glove materials: Nitrile rubber, Neoprene, PVC.
- **Body Protection:** Impervious clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
- **Respiratory Protection:** For nuisance exposures use type P95 (US) or type P1 (EU EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

| Property | Value |
|----------------------------------------------|------------------------------------------------------|
| Appearance | Dark Brown to Black Powder |
| Odor | Odorless |
| Odor Threshold | Not applicable |
| pH (10% Aqueous Slurry) | 6.5–8.0 |
| Melting Point/Freezing Point | Decomposes at ~535 °C (1000 °F) |
| Initial Boiling Point and Boiling Range | Not applicable (decomposes) |
| Flash Point | Not applicable |
| Evaporation Rate | Not applicable |
| Flammability (solid, gas) | Not flammable, but an oxidizer |
| Upper/Lower Flammability or Explosive Limits | Not applicable |
| Vapor Pressure | Not applicable |
| Vapor Density | Not applicable |
| Relative Density | 5.026 g/cm ³ (at 20 °C) [Source: PubChem] |
| Bulk Density | 0.8–1.2 g/cm ³ |
| Water Solubility | Insoluble |
| Partition Coefficient: n-octanol/water | Not applicable |
| Auto-ignition Temperature | Not applicable |
| Decomposition Temperature | ~535 °C |
| Viscosity | Not applicable (solid) |
| Explosive Properties | Not explosive |

| Property | Value |
|----------------------|-----------------------------|
| Oxidizing Properties | Oxidizing Solid, Category 2 |
| Particle Size (D50) | 2–8 µm |

10. Stability and Reactivity

10.1 Reactivity

Oxidizing agent. Reacts with reducing agents, strong acids, and combustible materials.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

Contact with strong reducing agents may cause violent reactions or fire. Reacts with concentrated acids to produce chlorine gas.

10.4 Conditions to avoid

Heat, flames, ignition sources, incompatible materials, moisture.

10.5 Incompatible materials

Strong reducing agents, strong acids (e.g., hydrochloric acid, sulfuric acid), combustible organic materials, finely divided metals.

10.6 Hazardous decomposition products

Under fire conditions: Oxygen, manganese oxides. Other decomposition products: No data available.

11. Toxicological Information

11.1 Information on toxicological effects

Acute Toxicity:

- **Oral LD50 (rat):** > 2000 mg/kg (Manganese dioxide is generally considered to have low acute oral toxicity)
- **Inhalation LC50:** No data available for MnO₂ specifically, but manganese dusts can be irritating.
- **Dermal LD50:** No data available.

Skin Corrosion/Irritation: May cause mild skin irritation.

Serious Eye Damage/Eye Irritation: May cause mechanical irritation to eyes.

Respiratory or Skin Sensitization: Not expected to be a skin sensitizer. Respiratory sensitization data not available.

Germ Cell Mutagenicity: No data available.

Carcinogenicity: Not classified as a human carcinogen by IARC, NTP, or OSHA. Some manganese compounds are suspected carcinogens, but MnO₂ itself is not typically listed.

Reproductive Toxicity: No data available.

STOT-Single Exposure: No data available.

STOT-Repeated Exposure: Prolonged or repeated inhalation of manganese dust can cause damage to the lungs and central nervous system, leading to manganism (neurological disorder).

Aspiration Hazard: Not an aspiration hazard.

12. Ecological Information

12.1 Toxicity

Aquatic Toxicity: Manganese compounds can be toxic to aquatic organisms at high concentrations. However, manganese dioxide is largely insoluble in water, which limits its bioavailability.

- **Fish:** No specific data for MnO₂; manganese salts generally have LC50 values in the range of 1-100 mg/L.
- **Daphnia and other aquatic invertebrates:** No specific data for MnO₂.
- **Algae:** No specific data for MnO₂.

12.2 Persistence and degradability

Inorganic substance, not biodegradable. Persistence in the environment is high due to its stability.

12.3 Bioaccumulative potential

Manganese can bioaccumulate in some organisms, but the insoluble nature of MnO₂ limits its bioaccumulation potential compared to soluble manganese compounds.

12.4 Mobility in soil

Low mobility in soil due to its insolubility.

12.5 Results of PBT and vPvB assessment

This substance does not meet the PBT/vPvB criteria of REACH, Annex XIII.

12.6 Other adverse effects

No known significant adverse effects other than those mentioned.

13. Disposal Considerations

13.1 Waste treatment methods

Product: Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Do not allow product to enter drains.

Contaminated Packaging: Dispose of as unused product.

14. Transport Information

14.1 UN Number

ADR/RID: 3137 **IMDG:** 3137 **IATA:** 3137

14.2 UN Proper Shipping Name

ADR/RID: OXIDIZING SOLID, N.O.S. (Manganese dioxide) **IMDG:** OXIDIZING SOLID, N.O.S. (Manganese dioxide) **IATA:** OXIDIZING SOLID, N.O.S. (Manganese dioxide)

14.3 Transport hazard class(es)

ADR/RID: 5.1 **IMDG:** 5.1 **IATA:** 5.1

14.4 Packing group

ADR/RID: II **IMDG:** II **IATA:** II

14.5 Environmental hazards

ADR/RID: No **IMDG Marine Pollutant:** No **IATA:** No

14.6 Special precautions for user

Refer to sections 6, 7, and 8 for handling, storage, and exposure controls.

15. Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

European Union Regulations:

- REACH (EC ¹⁹⁰⁷/₂₀₀₆): Registered substance.
- CLP (EC ¹²⁷²/₂₀₀₈): Classified according to CLP Regulation.

USA Federal Regulations:

- **TSCA (Toxic Substances Control Act):** All components are on the TSCA inventory or are exempt from TSCA requirements.
- **CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):** Not listed.
- **SARA 302 (Extremely Hazardous Substances):** Not subject to reporting.
- **SARA 313 (Toxic Chemical Release Inventory):** Manganese compounds are subject to reporting (Manganese Dioxide is a manganese compound).
- **OSHA (Occupational Safety and Health Administration):** See Section 8 for exposure limits.

State Regulations: Consult local and state regulations for specific requirements.

15.2 Chemical Safety Assessment

No Chemical Safety Assessment has been carried out for this substance/mixture.

16. Other Information

16.1 Date of preparation or last revision

Date of Preparation: March 02, 2026

16.2 Abbreviations and acronyms

- **ADR:** European Agreement concerning the International Carriage of Dangerous Goods by Road
- **CAS:** Chemical Abstracts Service
- **CLP:** Classification, Labelling and Packaging (Regulation)
- **D50:** Median particle size
- **EC:** European Community
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **IATA:** International Air Transport Association
- **IMDG:** International Maritime Dangerous Goods
- **LC50:** Lethal Concentration 50%
- **LD50:** Lethal Dose 50%
- **LOI:** Loss on Ignition
- **MnO₂:** Manganese Dioxide
- **MSDS:** Material Safety Data Sheet
- **OEL:** Occupational Exposure Limit
- **OSHA:** Occupational Safety and Health Administration
- **PBT:** Persistent, Bioaccumulative and Toxic
- **PEL:** Permissible Exposure Limit
- **PPE:** Personal Protective Equipment
- **REACH:** Registration, Evaluation, Authorisation and Restriction of Chemicals
- **RID:** Regulations concerning the International Carriage of Dangerous Goods by Rail
- **STEL:** Short-Term Exposure Limit
- **STOT:** Specific Target Organ Toxicity
- **TDS:** Technical Data Sheet
- **TLV:** Threshold Limit Value
- **TSCA:** Toxic Substances Control Act
- **TWA:** Time-Weighted Average

- **UN:** United Nations
- **vPvB:** very Persistent and very Bioaccumulative

16.3 Key literature references and sources for data

- Supplier's Technical Data Sheet (manganesesupply.com)
- ECHA - European Chemicals Agency (echa.europa.eu)
- PubChem (pubchem.ncbi.nlm.nih.gov)
- OSHA Occupational Safety and Health Administration (osha.gov)
- ACGIH - American Conference of Governmental Industrial Hygienists (acgih.org)
- NIOSH - National Institute for Occupational Safety and Health (cdc.gov/niosh)

16.4 Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.