Safety Data Sheet: Manganese Dioxide (MnO_2)

Section 1: Identification

Product Identifier: Manganese Dioxide (MnO_2) **Recommended Use:** Battery-grade material for Magnesium-Manganese Dry Cell Production. **Restrictions on Use:** For industrial use only. Not for food, drug, or household use.

Supplier Details:

- **Company 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

Section 2: Hazard(s) Identification

GHS Classification:

- **Oxidizing Solids:** Category 2 [1]
- **Acute Toxicity (Oral):** Category 4 [1]
- **Specific Target Organ Toxicity - Repeated Exposure:** Category 2 (Central Nervous System, Lungs) [1]

Hazard Pictograms:

- Flame over Circle (Oxidizer)
- Exclamation Mark (Harmful)

- Health Hazard (Specific Target Organ Toxicity)

Signal Word: Danger

Hazard Statements:

- H272: May intensify fire; oxidizer.
- H302: Harmful if swallowed.
- H373: May cause damage to organs (Central Nervous System, Lungs) through prolonged or repeated exposure.

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.
  - P264: Wash thoroughly after handling.
  - P270: Do not eat, drink or smoke when using this product.
  - P280: Wear protective gloves/protective clothing/eye protection/face protection.
- **Response:**
  - P301 + P312 + P330: IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
  - P370 + P378: In case of fire: Use water spray, foam, dry chemical or carbon dioxide to extinguish.
  - P314: Get medical advice/attention if you feel unwell.
- **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.

Section 3: Composition/Information on Ingredients

Chemical Name	Common Name	CAS Number	Concentration
Manganese Dioxide	MnO_2	1313-13-9 [2]	88.0–92.0%

Section 4: First-Aid Measures

Description of necessary first-aid measures:

- **Inhalation:** Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms, call a POISON CENTER or doctor/physician.
- **Skin Contact:** Wash with plenty of water. If skin irritation occurs, get medical advice/attention.
- **Eye Contact:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.
- **Ingestion:** Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. Do NOT induce vomiting.

Most important symptoms/effects, acute and delayed:

- **Acute:** May cause irritation to eyes, skin, and respiratory tract. Harmful if swallowed.
- **Delayed:** Prolonged or repeated exposure may cause damage to the central nervous system and lungs (manganism).

Indication of immediate medical attention and special treatment needed:

- Treat symptomatically. In case of doubt or if symptoms persist, seek medical attention.

Section 5: Fire-Fighting Measures

Suitable extinguishing media:

- Use water spray, foam, dry chemical, or carbon dioxide. Product is an oxidizer, so avoid using extinguishing agents that may react with it.

Specific hazards arising from the chemical:

- May intensify fire; oxidizer. Upon decomposition, may emit toxic fumes of manganese oxides.

Special protective equipment and precautions for fire-fighters:

- Firefighters should wear self-contained breathing apparatus (SCBA) and full firefighting turnout gear.

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures:

- Evacuate personnel to safe areas. Ensure adequate ventilation. Wear appropriate personal protective equipment (PPE) as specified in Section 8.

Environmental precautions:

- Prevent further leakage or spillage if safe to do so. Do not allow product to enter drains, sewers, or watercourses.

Methods and materials for containment and cleaning up:

- **Small Spills:** Carefully sweep up or vacuum spilled material and place in a suitable container for disposal. Avoid dust generation.
- **Large Spills:** Contain spill with inert material (e.g., sand, earth). Collect spilled material and place in appropriate containers for disposal. Avoid dust generation.

Section 7: Handling and Storage

Precautions for safe handling:

- Avoid contact with skin, eyes, and clothing. Avoid breathing dust. Ensure adequate ventilation. Keep away from combustible materials. Do not eat, drink, or smoke when using this product. Wash hands thoroughly after handling.

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, acids, combustible materials).

Section 8: Exposure Controls/Personal Protection

Control parameters:

- **OSHA Permissible Exposure Limit (PEL):** 5 mg/m^3 (as Mn, ceiling) [3]
- **ACGIH Threshold Limit Value (TLV):** 0.02 mg/m^3 (respirable fraction, as Mn, TWA); 0.1 mg/m^3 (inhalable fraction, as Mn, TWA) [4]

Appropriate engineering controls:

- Use local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits. Provide eyewash station and safety shower.

Individual protection measures, such as personal protective equipment (PPE):

- **Eye/Face Protection:** Safety glasses with side-shields or chemical safety goggles.
- **Skin Protection:** Protective gloves (e.g., nitrile, PVC) and protective clothing to prevent skin contact.
- **Respiratory Protection:** If exposure limits are exceeded or irritation is experienced, use a NIOSH-approved respirator with P100 cartridges for dust/mist.
- **General Hygiene Considerations:** Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the workday.

Section 9: Physical and Chemical Properties

- **Appearance:** Black powder
- **Odor:** Odorless

- **Odor Threshold:** Not applicable
- **pH:** 7-8 (10% slurry) [5]
- **Melting Point/Freezing Point:** ~535 °C (decomposes) [5]
- **Initial Boiling Point and Boiling Range:** Not applicable (decomposes before boiling)
- **Flash Point:** Not applicable
- **Evaporation Rate:** Not applicable
- **Flammability (solid, gas):** Non-flammable, but an oxidizer.
- **Upper/Lower Flammability or Explosive Limits:** Not applicable
- **Vapor Pressure:** Not applicable
- **Vapor Density:** Not applicable
- **Relative Density (Bulk Density):** 0.8–1.2 g/cm^3 (from website)
- **Solubility(ies):** Insoluble in water; soluble in strong acids with reduction.
- **Partition Coefficient n-octanol/water:** Not applicable
- **Auto-ignition Temperature:** Not applicable
- **Decomposition Temperature:** ~535 °C [5]
- **Viscosity:** Not applicable (solid)

Section 10: Stability and Reactivity

Reactivity:

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

Chemical stability:

- Stable under recommended storage conditions.

Possibility of hazardous reactions:

- Reacts violently with strong reducing agents and acids, potentially releasing heat and toxic gases.

Conditions to avoid:

- Heat, flames, sparks, incompatible materials, dust generation.

Incompatible materials:

- Strong reducing agents, strong acids, combustible materials, finely divided metals.

Hazardous decomposition products:

- Manganese oxides (at high temperatures).

Section 11: Toxicological Information

Information on toxicological effects:

- **Acute Toxicity (Oral):** Harmful if swallowed. LD50 (oral, rat): >3478 mg/kg [6]
- **Skin Corrosion/Irritation:** May cause mild irritation.
- **Serious Eye Damage/Irritation:** May cause mechanical irritation.
- **Respiratory or Skin Sensitization:** Not expected to be a sensitizer.
- **Germ Cell Mutagenicity:** No data available.
- **Carcinogenicity:** Not classified as a carcinogen by IARC, NTP, or OSHA.
- **Reproductive Toxicity:** No data available.
- **STOT-Single Exposure:** No data available.
- **STOT-Repeated Exposure:** May cause damage to the central nervous system and lungs through prolonged or repeated exposure (manganism). Symptoms include neurological disorders, tremors, and psychological disturbances.
- **Aspiration Hazard:** Not an aspiration hazard.

Section 12: Ecological Information

Ecotoxicity:

- **Fish:** LC50 (96h, fish): >100 mg/L (Manganese compounds, general) [7]

- **Aquatic Invertebrates:** EC50 (48h, Daphnia magna): >100 mg/L (Manganese compounds, general) [7]

Persistence and Degradability:

- Manganese dioxide is an inorganic compound and is not expected to be biodegradable. It can undergo redox reactions in the environment.

Bioaccumulative Potential:

- Manganese can bioaccumulate in some organisms, but MnO_2 itself has low bioavailability.

Mobility in Soil:

- Low mobility in soil due to its insolubility.

Other adverse effects:

- No other adverse environmental effects are expected.

Section 13: Disposal Considerations

Waste treatment methods:

- Dispose of contents/container in accordance with federal, state, and local regulations. Consult with a licensed waste disposal company. Do not dispose of in drains or sewers.

Section 14: Transport Information

- **UN Number:** 3137 [8]
- **UN Proper Shipping Name:** OXIDIZING SOLID, N.O.S. (Manganese dioxide)
- **Transport Hazard Class(es):** 5.1 (Oxidizer)
- **Packing Group:** II
- **Environmental Hazards:** Not classified as an environmental hazard for transport.
- **Special Precautions for User:** Refer to sections 6, 7, and 8.

Section 15: Regulatory Information

Safety, health and environmental regulations specific for the product in question:

- **US Federal Regulations:**
  - **TSCA (Toxic Substances Control Act):** All components are listed on the TSCA Inventory or are exempt.
  - **CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):** Not applicable.
  - **SARA Title III:**
    - **Section 302 (Extremely Hazardous Substances):** Not applicable.
    - **Section $^{311}/_{312}$ (Hazard Categories):** Oxidizer, Acute Toxicity, Specific Target Organ Toxicity (Repeated Exposure).
    - **Section 313 (Toxic Release Inventory):** Manganese compounds (as Mn) are subject to reporting requirements.
- **State Regulations:** Consult local and state regulations for specific requirements.
- **International Regulations:**
  - **European Union:** Classified according to Regulation (EC) No $^{1272}/_{2008}$ (CLP).
  - **Canada:** This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations (HPR) and the SDS contains all the information required by the HPR.

Section 16: Other Information

Date of Preparation: February 5, 2026 **Date of Last Revision:** N/A

Key/Legend to abbreviations and acronyms used in the SDS:

- **ACGIH:** American Conference of Governmental Industrial Hygienists
- **CAS:** Chemical Abstracts Service
- **CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act
- **CLP:** Classification, Labelling and Packaging (Regulation)

- **EC50:** Half maximal effective concentration
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **IARC:** International Agency for Research on Cancer
- **LC50:** Lethal concentration, 50%
- **LD50:** Lethal dose, 50%
- **MnO_2:** Manganese Dioxide
- **MSDS:** Material Safety Data Sheet
- **NIOSH:** National Institute for Occupational Safety and Health
- **N.O.S.:** Not Otherwise Specified
- **NTP:** National Toxicology Program
- **OSHA:** Occupational Safety and Health Administration
- **PEL:** Permissible Exposure Limit
- **PPE:** Personal Protective Equipment
- **SARA:** Superfund Amendments and Reauthorization Act
- **SCBA:** Self-Contained Breathing Apparatus
- **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

References: [1] ECHA - Manganese dioxide. Available at: https://echa.europa.eu/substance-information/-/substanceinfo/100.014.194 [2] PubChem - Manganese Dioxide. Available at: https://pubchem.ncbi.nlm.nih.gov/compound/Manganese-dioxide [3] OSHA - Permissible Exposure Limits (PELs). Available at: https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1000TABLEZ1 [4] ACGIH - TLVs and BEIs. Available at: https://www.acgih.org/science/tlvs-and-beis/ (General information, specific values may require subscription) [5] Sigma-Aldrich - Manganese(IV) oxide. Available at: https://www.sigmaaldrich.com/US/en/product/aldrich/230185 [6] European Chemicals Agency (ECHA) - Registered substances: Manganese dioxide.

Available at: https://echa.europa.eu/registration-dossier/-/registered-dossier/15446/1 [7] ECHA - Manganese compounds. Available at: https://echa.europa.eu/substance-information/-/substanceinfo/100.004.921 [8] PIM (Poison Information Monograph) 330 - Manganese. Available at: http://www.inchem.org/documents/pims/chemical/pim330.htm