Safety Data Sheet (SDS)

1. Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Identifier

- **Product Name:** High-Purity Manganese Dioxide for Pharmaceutical Synthesis
- **Chemical Name:** Manganese Dioxide
- **Synonyms:** MnO_2, Manganese(IV) oxide, Pyrolusite
- **CAS No.:** 1313-13-9
- **EC No.:** 215-202-6
- **REACH Registration No.:** Not available (Substance is generally exempt or covered by a tonnage band registration)

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

- **Identified Uses:** Organic oxidation and dehydrogenation reactions in pharmaceutical synthesis, research laboratories, fine chemicals production.
- **Uses Advised Against:** None known.

1.3 Details of the Supplier of the Safety Data Sheet

- **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:** +8618273793022
- **Website:** manganesesupply.com

1.4 Emergency Telephone Number

- **Emergency Phone:** Consult local emergency services.

2. Hazards Identification

2.1 Classification of the Substance or Mixture

According to Regulation (EC) No $^{1272}/_{2008}$ (CLP) and GHS Rev. 7:

- **Acute Toxicity (Oral):** Category 4 (H302 - Harmful if swallowed)
- **Specific Target Organ Toxicity - Repeated Exposure:** Category 2 (H373 - May cause damage to organs (Central Nervous System) through prolonged or repeated exposure if inhaled)

2.2 Label Elements

- **Hazard Pictograms:** GHS07 (Exclamation Mark), GHS08 (Health Hazard)
- **Signal Word:** Warning
- **Hazard Statements:**
    - H302: Harmful if swallowed.
    - H373: May cause damage to organs (Central Nervous System) through prolonged or repeated exposure if inhaled.
- **Precautionary Statements:**
    - **Prevention:**
        - 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.
    - **Response:**
        - P301 + P312 + P330: IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
        - P314: Get medical advice/attention if you feel unwell.

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

2.3 Other Hazards

- **Dust Hazard:** Fine dust may cause respiratory irritation. Prolonged exposure to manganese dust can lead to manganism, a neurological disorder.
- **Environmental:** Not considered acutely hazardous to the aquatic environment, but avoid release to the environment.

3. Composition/Information on Ingredients

3.1 Substances

- **Chemical Name:** Manganese Dioxide
- **CAS No.:** 1313-13-9
- **EC No.:** 215-202-6
- **Concentration:** 98-99%

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.
- **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:** Harmful if swallowed. May cause irritation to eyes, skin, and respiratory tract. Inhalation of high concentrations of dust may cause metal fume fever.
- **Delayed:** Prolonged or repeated inhalation of manganese dust may cause manganism, a neurological disorder affecting the central nervous system, characterized by psychiatric disturbances, gait disturbances, and Parkinsonian symptoms.

4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

- **Treatment:** Symptomatic treatment and supportive therapy as indicated. Specific antidotes are not available.

5. Firefighting Measures

5.1 Extinguishing Media

- **Suitable Extinguishing Media:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Product is non-flammable.
- **Unsuitable Extinguishing Media:** None known.

5.2 Special Hazards Arising from the Substance or Mixture

- **Hazardous Combustion Products:** Manganese oxides.
- **Nature of Decomposition Products:** Decomposes at high temperatures (~535 °C) to release oxygen and other manganese oxides.

5.3 Advice for Firefighters

- **Protective Equipment:** Wear self-contained breathing apparatus for firefighting if necessary. Wear full protective clothing.

6. Accidental Release Measures

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

- **Personal Precautions:** Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
- **Emergency Procedures:** Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

6.2 Environmental Precautions

- **Environmental Precautions:** Do not let product enter drains. Avoid discharge into the environment.

6.3 Methods and Material for Containment and Cleaning Up

- **Containment:** Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.
- **Cleaning Up:** Neutralize with a suitable agent if necessary. Clean contaminated surfaces thoroughly.

6.4 Reference to Other Sections

- For disposal considerations, see Section 13.
- For personal protective equipment, see Section 8.

7. Handling and Storage

7.1 Precautions for Safe Handling

- **Handling:** Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. For precautions see section 2.2.

- **Hygiene Measures:** Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

7.2 Conditions for Safe Storage, Including Any Incompatibilities

- **Storage:** Store in cool, dry place. Keep container tightly closed in a dry and well-ventilated place. Keep away from strong acids, reducing agents, and combustible materials.
- **Incompatibilities:** Strong acids, reducing agents, easily oxidizable materials.

7.3 Specific End Use(s)

- **Specific End Use(s):** Apart from the uses mentioned in section 1.2, no other specific uses are stipulated.

8. Exposure Controls/Personal Protection

8.1 Control Parameters

- **Occupational Exposure Limits (OELs):**
  - **Manganese (as Mn):**
    - **OSHA PEL (Permissible Exposure Limit):** 5 mg/m^3 (ceiling, fume); 1 mg/m^3 (TWA, dust and compounds)
    - **ACGIH TLV (Threshold Limit Value):** 0.02 mg/m^3 (respirable fraction, TWA); 0.1 mg/m^3 (inhalable fraction, TWA)
    - **NIOSH REL (Recommended Exposure Limit):** 1 mg/m^3 (TWA); 3 mg/m^3 (STEL)

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 process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended 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. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.
- **Body Protection:** Complete suit protecting against chemicals, 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

- **Appearance:** Black powder
- **Odor:** Odorless
- **Odor Threshold:** Not applicable
- **pH:** Not applicable (insoluble solid)
- **Melting Point/Freezing Point:** ~535 °C (decomposes)
- **Initial Boiling Point and Boiling Range:** Not applicable (decomposes)
- **Flash Point:** Not applicable (inorganic compound)
- **Evaporation Rate:** Not applicable
- **Flammability (solid, gas):** Non-flammable
- **Upper/Lower Flammability or Explosive Limits:** Not applicable

- **Vapor Pressure:** Not applicable
- **Vapor Density:** Not applicable
- **Relative Density (Water = 1):** 5.026 g/cm^3
- **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
- **Oxidizing Properties:** Oxidizing agent, especially at high temperatures.

9.2 Other Information

- **Particle size (D50):** 5–20 µm
- **Loss on ignition:** ≤0.5 %
- **Impurities (Fe, Al, Pb, Cd):** ≤0.01 %

10. Stability and Reactivity

10.1 Reactivity

- **Reactivity:** Stable under recommended storage conditions.

10.2 Chemical Stability

- **Chemical Stability:** Stable under normal conditions of use and storage.

10.3 Possibility of Hazardous Reactions

- **Hazardous Reactions:** Reacts with strong acids to produce oxygen and manganese salts. Can act as an oxidizing agent.

10.4 Conditions to Avoid

- **Conditions to Avoid:** High temperatures (above 535 °C), incompatible materials.

10.5 Incompatible Materials

- **Incompatible Materials:** Strong acids, reducing agents, easily oxidizable materials.

10.6 Hazardous Decomposition Products

- **Hazardous Decomposition Products:** Other manganese oxides, oxygen at high temperatures. In the event of fire: see section 5.

11. Toxicological Information

11.1 Information on Toxicological Effects

- **Acute Toxicity:**
  - **Oral LD50 (rat):** > 3478 mg/kg (OECD Test Guideline 401) [1]
  - **Inhalation LC50 (rat):** > 5.15 mg/L (4h) (OECD Test Guideline 403) [1]
  - **Dermal LD50 (rat):** > 2000 mg/kg (OECD Test Guideline 402) [1]
- **Skin Corrosion/Irritation:** No data available, generally not considered irritating.
- **Serious Eye Damage/Eye Irritation:** No data available, generally not considered irritating.
- **Respiratory or Skin Sensitisation:** No data available.
- **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 organs (Central Nervous System) through prolonged or repeated exposure if inhaled (manganism).
- **Aspiration Hazard:** Not an aspiration hazard.

12. Ecological Information

12.1 Toxicity

- **Toxicity to Fish:** LC50 - Oncorhynchus mykiss (rainbow trout) - > 100 mg/L - 96 h [1]
- **Toxicity to Daphnia and Other Aquatic Invertebrates:** EC50 - Daphnia magna (Water flea) - > 100 mg/L - 48 h [1]
- **Toxicity to Algae:** EC50 - Pseudokirchneriella subcapitata (green algae) - > 100 mg/L - 72 h [1]

12.2 Persistence and Degradability

- **Persistence:** Inorganic substance, not readily biodegradable.
- **Degradability:** Not applicable.

12.3 Bioaccumulative Potential

- **Bioaccumulation:** Low potential for bioaccumulation.

12.4 Mobility in Soil

- **Mobility:** Low mobility in soil due to low solubility.

12.5 Results of PBT and vPvB Assessment

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

12.6 Other Adverse Effects

- **Other Adverse Effects:** No known significant adverse effects or critical hazards.

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. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.
- **Contaminated Packaging:** Dispose of as unused product.

14. Transport Information

- **ADR/RID (Land Transport):** Not regulated as a hazardous material.
- **IMDG (Sea Transport):** Not regulated as a hazardous material.
- **IATA (Air Transport):** Not regulated as a hazardous material.

15. Regulatory Information

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture

- **EU Regulations:**
  - Regulation (EC) No $^{1907}/_{2006}$ (REACH)
  - Regulation (EC) No $^{1272}/_{2008}$ (CLP)
- **National Regulations:** Consult local and national regulations for specific requirements.

15.2 Chemical Safety Assessment

- **Chemical Safety Assessment:** A Chemical Safety Assessment has not been carried out for this substance.

16. Other Information

16.1 Date of Preparation or Last Revision

- **Date:** February 10, 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
- **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%
- **MnO_2:** 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
- **TWA:** Time-Weighted Average
- **vPvB:** very Persistent and very Bioaccumulative

16.3 Key Literature References and Sources for Data

[1] ECHA (European Chemicals Agency) - Information on registered substances: Manganese dioxide (CAS: 1313-13-9). Available at: https://echa.europa.eu/substance-information/-/substanceinfo/100.013.821

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