Safety Data Sheet (SDS)

1. Identification

Product Name: High Activity Manganese Dioxide (MnO_2) **Recommended Use:** Industrial wastewater oxidation, advanced oxidation processes (AOPs), sludge reduction aids, odor control, pre-treatment oxidation. **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

2. Hazard(s) Identification

GHS Classification (according to OSHA HCS 29 CFR 1910.1200):

- Acute toxicity (Oral), Category 4 [1]
- Acute toxicity (Inhalation), Category 4 [1]

Signal Word: Warning

Hazard Statements:

- H302: Harmful if swallowed [1]
- H332: Harmful if inhaled [1]

Precautionary Statements:

- **Prevention:**
  - P261: Avoid breathing dust/fume/gas/mist/vapors/spray.
  - P264: Wash face, hands, and any exposed skin thoroughly after handling.
  - P270: Do not eat, drink or smoke when using this product.
  - P271: Use only outdoors or in a well-ventilated area.

- **Response:**
  - P301 + P312 + P330: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth.
  - P304 + P340 + P312: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or doctor/physician if you feel unwell.
- **Disposal:**
  - P501: Dispose of contents/container in accordance with local/regional/national/international regulations.

3. Composition/Information on Ingredients

Substance: Manganese Dioxide (MnO_2) **CAS No.:** 1313-13-9 **EC No.:** 215-202-6 **Purity:** 85-92% (as MnO_2) [Product Link]

4. First-Aid Measures

General Advice: Show this safety data sheet to the doctor in attendance. [2]

If Inhaled: Remove person to fresh air and keep comfortable for breathing. If not breathing, give artificial respiration. Call a POISON CENTER or doctor/physician if you feel unwell. [2] [3]

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

In Case of Eye Contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Remove contact lenses, if present and easy to do. Continue rinsing.

If Swallowed: Rinse mouth with water. Do NOT induce vomiting. Call a POISON CENTER or doctor/physician if you feel unwell. [1]

5. Fire-Fighting Measures

Suitable Extinguishing Media: Product is not flammable. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. [4]

Unsuitable Extinguishing Media: No information available.

Specific Hazards Arising from the Chemical: When heated to decomposition, may emit toxic fumes (e.g., Manganese/manganese oxides). [5] [6]

Special Protective Equipment and Precautions for Firefighters: Wear self-contained breathing apparatus for firefighting if necessary. [7]

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures: Use personal protective equipment as required. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Evacuate personnel to safe areas. [8]

Environmental Precautions: Do not let product enter drains. Avoid discharge into the environment. [9]

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. [9]

7. Handling and Storage

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. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. [8]

Conditions for Safe Storage, Including Any Incompatibilities: Keep container tightly closed in a dry and well-ventilated place. Store away from incompatible materials (e.g., combustible and reducing materials). [10]

8. Exposure Controls/Personal Protection

Control Parameters:

- **Occupational Exposure Limits:** Consult local regulatory authorities for specific occupational exposure limits for Manganese and its compounds.

Engineering Controls: Handle in accordance with good industrial hygiene and safety practice. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. [11]

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:** 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

Appearance: Black powder [Product Link] **Odor:** Odorless **Odor Threshold:** Not applicable **pH (10 g/L Slurry):** 6.5–8.0 [Product Link] **Melting Point/Freezing Point:** ~535 °C (decomposes) [12] **Initial Boiling Point and Boiling Range:** Not applicable

Flash Point: Not applicable **Evaporation Rate:** Not applicable **Flammability (solid, gas):** Non-flammable [4] **Upper/Lower Flammability or Explosive Limits:** Not applicable **Vapor Pressure:** Not applicable **Vapor Density:** Not applicable **Relative Density:** 5.026 g/cm³ (at 25 °C) [12] **Bulk Density:** 0.7–1.1 g/cm³ [Product Link] **Water Solubility:** Insoluble [12] **Partition Coefficient (n-octanol/water):** Not applicable **Auto-ignition Temperature:** Not applicable **Decomposition Temperature:** >535 °C [12] **Viscosity:** Not applicable **Explosive Properties:** Not explosive **Oxidizing Properties:** Strong oxidant [10] **Particle Size (D50):** 5–20 μm [Product Link] **Specific Surface Area:** 25–50 m²/g [Product Link] **Loss on Ignition (LOI):** ≤ 5 % [Product Link] **Moisture Content:** ≤ 2 % [Product Link]

10. Stability and Reactivity

Reactivity: The substance is a strong oxidant. It reacts violently with combustible and reducing materials. [10]

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Reacts with aluminum, hydrogen peroxide, and other reducing agents. [10]

Conditions to Avoid: Incompatible materials, dust formation.

Incompatible Materials: Combustible materials, reducing agents, strong acids, strong bases, aluminum, hydrogen peroxide. [10]

Hazardous Decomposition Products: Manganese/manganese oxides. [5] [6]

11. Toxicological Information

Acute Toxicity:

- **Oral:** Harmful if swallowed. (Category 4) [1]
- **Inhalation:** Harmful if inhaled. (Category 4) [1]
- **Dermal:** No data available.

Skin Corrosion/Irritation: No data available.

Serious Eye Damage/Eye Irritation: No data available.

Respiratory or Skin Sensitization: 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: Chronic exposure to manganese dust or fumes may affect the central nervous system, leading to a condition known as manganism. Symptoms include tremors, difficulty walking, and psychiatric disturbances. [13]

Aspiration Hazard: Not an aspiration hazard.

12. Ecological Information

Toxicity: No data available for the aquatic toxicity of manganese dioxide. Manganese compounds can be toxic to aquatic organisms at high concentrations.

Persistence and Degradability: Manganese dioxide is an inorganic compound and is not expected to be biodegradable. [14]

Bioaccumulative Potential: No data available.

Mobility in Soil: Insoluble in water, so low mobility in soil is expected.

Other Adverse Effects: No information available.

13. Disposal Considerations

Waste Treatment Methods: Dispose of contents/container in accordance with local/regional/national/international regulations. Do not allow product to enter drains. Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. [15]

14. Transport Information

DOT (US): Not regulated as a hazardous material for transport. **IMDG:** Not regulated as a hazardous material for transport. **IATA:** Not regulated as a hazardous material for transport.

15. Regulatory Information

US Federal Regulations:

- **SARA 302 Components:** No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
- **SARA 313 Components:** The following components are subject to reporting levels established by SARA Title III, Section 313:
  - Manganese compounds (as Manganese) - CAS No. 7439-96-5 (Manganese is present in Manganese Dioxide)
- **SARA $^{311}/_{312}$ Hazards:** Acute Health Hazard, Chronic Health Hazard
- **Clean Water Act (CWA):** Not applicable
- **Clean Air Act (CAA):** Manganese compounds are listed as hazardous air pollutants (HAPs) under the Clean Air Act.

US State Regulations: Consult individual state regulations for specific requirements.

California Proposition 65: This product does not contain any chemicals known to the State of California to cause cancer, birth defects, or any other reproductive harm.

International Regulations:

- **European Union (EU):** Consult REACH regulations for specific requirements.
- **Canada:** Consult WHMIS regulations for specific requirements.

16. Other Information

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References: [1] Safety Data Sheet Manganese Dioxide - Aquaphoenix Scientific [2] SAFETY DATA SHEET - Sigma-Aldrich [3] SAFETY DATA SHEET - NIST [4] Safety Data Sheet Manganese Dioxide - Columbus Chemical [5] Safety Data Sheet (SDS) Manganese Dioxide - LPS [6] SAFETY DATA SHEET - Sigma-Aldrich [7] SAFETY DATA SHEET - Spectrum Chemical [8] manganese-dioxide-powder-lab-grade-safety-data-sheet - Lab Alley [9] Safety Data Sheet - Fisher Scientific [10] ICSC 0175 - MANGANESE DIOXIDE - ILO [11] Hazardous Substance Fact Sheet - NJ Health [12] Manganese dioxide | MnO2 | CID 14801 - PubChem - NIH [13] Manganese - Wikipedia [14] Manganese(IV) oxide: Biodegradability - Sigma-Aldrich [15] Safety Data Sheet - Fisher Scientific