Safety Data Sheet: High-Purity Synthetic MnO_2 for Energy Storage

Date of Issue: 2026-02-05 **Revision Number:** 1.0

1. Identification

Product Identifier: High-Purity Synthetic Manganese Dioxide (MnO_2) **Chemical Name:** Manganese Dioxide **Synonyms:** Manganese(IV) oxide, Pyrolusite (synthetic), Activated Manganese Dioxide **CAS Number:** 1313-13-9 **EC Number:** 215-202-6

Recommended Use: Cathode material for batteries (alkaline, zinc-manganese, rechargeable systems), electrochemical capacitors, industrial backup and specialty power systems. **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

Emergency Phone Number: +8618273793022 (General)

2. Hazard(s) Identification

GHS Classification (Globally Harmonized System of Classification and Labelling of Chemicals):

- **Acute Toxicity (Oral):** Category 4
- **Specific Target Organ Toxicity - Repeated Exposure:** Category 2 (Lungs)

Hazard Pictograms:


GHS07 - Exclamation Mark

 GHS08 - Health Hazard

Signal Word: Warning

Hazard Statements:

- H302 - Harmful if swallowed.
- H373 - May cause damage to organs (lungs) through prolonged or repeated exposure.

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 - IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell.
- P330 - 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.

3. Composition/Information on Ingredients

Chemical Name	CAS Number	EC Number	Concentration (w/w%)
Manganese Dioxide	1313-13-9	215-202-6	99.50 – 99.90

Note: The product is a high-purity synthetic manganese dioxide. Other impurities are present at trace levels as indicated in the Technical Datasheet.

4. First-Aid Measures

Description of First-Aid Measures:

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Skin Contact: Wash off with soap and plenty of water. Get medical attention if irritation develops and persists.

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

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

Most Important Symptoms and Effects, Both Acute and Delayed: Symptoms may include irritation of the respiratory tract, skin, and eyes. Prolonged or repeated exposure may cause damage to the lungs.

Indication of Any Immediate Medical Attention and Special Treatment Needed: Treat symptomatically. Medical observation is recommended for 24-48 hours after overexposure due to the possibility of delayed onset of symptoms.

5. Fire-Fighting Measures

Suitable Extinguishing Media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Unsuitable Extinguishing Media: No information available.

Specific Hazards Arising from the Chemical: Not considered to be a fire hazard. Non-combustible. May release toxic fumes of manganese oxides under fire conditions.

Hazardous Combustion Products: Manganese oxides.

Special Protective Equipment and Precautions for Firefighters: Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

6. Accidental Release Measures

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. Avoid breathing dust.

Environmental Precautions: Do not let product enter drains. Do not allow material to contaminate ground water system.

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.

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. For precautions see section 2.2.

Conditions for Safe Storage, Including Any Incompatibilities: Keep container tightly closed in a dry and well-ventilated place. Store away from incompatible materials (see section 10).

8. Exposure Controls/Personal Protection

Control Parameters:

Occupational Exposure Limits (OELs):

Component	CAS No.	Value	Control Parameters	Basis
Manganese, inorganic compounds (as Mn)	7439-96-5	TWA	0.02 mg/m³ (respirable fraction)	ACGIH TLV
		TWA	0.1 mg/m³ (inhalable fraction)	ACGIH TLV
		TWA	5 mg/m³ (fume, as Mn)	OSHA PEL

Engineering Controls: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday. Use adequate ventilation to keep airborne concentrations low.

Individual Protection Measures, Such as 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: Choose body protection according to the amount and concentration of the dangerous substance at the work place.

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 **Odor:** Odorless **Odor Threshold:** Not applicable **pH (10% slurry):** 6.5–8.5 **Melting Point/Freezing Point:** ~535 °C (Decomposes) **Initial Boiling**

Point and Boiling Range: Not applicable (decomposes before boiling) **Flash Point:** Not applicable **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):** ~5.0 g/cm³ (approximate, based on typical density of MnO_2) **Bulk Density:** 0.70–0.95 g/cm³ **Tap Density:** 1.50–1.80 g/cm³ **Solubility(ies):** Insoluble in water. Soluble in hydrochloric acid with evolution of chlorine; soluble in sulfuric acid with evolution of oxygen. **Partition Coefficient n-octanol/water (log value):** Not applicable **Auto-ignition Temperature:** Not applicable **Decomposition Temperature:** ~535 °C **Viscosity:** Not applicable (solid)

10. Stability and Reactivity

Reactivity: Not reactive under normal conditions of use.

Chemical Stability: Stable under recommended storage conditions.

Possibility of Hazardous Reactions: Reacts with strong reducing agents, strong acids (e.g., hydrochloric acid, sulfuric acid) to produce chlorine or oxygen gas. Can act as an oxidizing agent.

Conditions to Avoid: Incompatible materials, high temperatures (above decomposition temperature).

Incompatible Materials: Strong reducing agents, strong acids, organic materials.

Hazardous Decomposition Products: Manganese oxides.

11. Toxicological Information

Information on Toxicological Effects:

Acute Toxicity:

- **Oral LD50 (Rat):** 9000 mg/kg (Manganese dioxide) [1]
- **Inhalation LC50:** No data available
- **Dermal LD50:** No data available

Skin Corrosion/Irritation: May cause mild irritation.

Serious Eye Damage/Irritation: May cause mild 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 lungs through prolonged or repeated exposure (manganism, pneumoconiosis) [2].

Aspiration Hazard: Not an aspiration hazard.

12. Ecological Information

Ecotoxicity:

- **Fish:** No data available
- **Daphnia and other aquatic invertebrates:** No data available
- **Algae:** No data available

Persistence and Degradability: Manganese dioxide is an inorganic compound and is not expected to be biodegradable. It is persistent in the environment.

Bioaccumulative Potential: Not expected to bioaccumulate significantly.

Mobility in Soil: Low mobility in soil due to its insoluble nature.

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

13. Disposal Considerations

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

UN Number: Not regulated as a hazardous material for transport.

UN Proper Shipping Name: Not applicable

Transport Hazard Class(es): Not applicable

Packing Group: Not applicable

Environmental Hazards: Not a marine pollutant.

Special Precautions for User: No special precautions required.

15. Regulatory Information

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

EU Regulations:

- **REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals):** This substance is not subject to authorization or restriction under REACH.
- **CLP (Classification, Labelling and Packaging of Substances and Mixtures):** Classified according to CLP Regulation (EC) No $^{1272}/_{2008}$.

US Federal Regulations:

- **TSCA (Toxic Substances Control Act):** All components are listed on the TSCA inventory or are exempt from listing.

- **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):** Acute Health Hazard, Chronic Health Hazard.
  - **Section 313 (Toxic Release Inventory):** Manganese compounds are subject to reporting requirements.

Other Regulations: Consult local, regional, national, and international regulations for specific requirements.

16. Other Information

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Key/Legend to Abbreviations and Acronyms Used in the SDS:

- **CAS:** Chemical Abstracts Service
- **EC:** European Community
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **LD50:** Lethal Dose, 50%
- **LC50:** Lethal Concentration, 50%
- **OEL:** Occupational Exposure Limit
- **TWA:** Time-Weighted Average
- **ACGIH:** American Conference of Governmental Industrial Hygienists
- **TLV:** Threshold Limit Value
- **OSHA:** Occupational Safety and Health Administration
- **PEL:** Permissible Exposure Limit
- **PPE:** Personal Protective Equipment
- **STOT:** Specific Target Organ Toxicity
- **REACH:** Registration, Evaluation, Authorisation and Restriction of Chemicals

- **CLP:** Classification, Labelling and Packaging of Substances and Mixtures
- **TSCA:** Toxic Substances Control Act
- **CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act
- **SARA:** Superfund Amendments and Reauthorization Act

References: [1] PubChem. Manganese Dioxide. National Library of Medicine. Available at: https://pubchem.ncbi.nlm.nih.gov/compound/Manganese-dioxide [2] Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological Profile for Manganese. U.S. Department of Health and Human Services. Available at: https://www.atsdr.cdc.gov/toxprofiles/tp151.pdf