# SAFETY DATA SHEET

**EMD Powder for Primary Lithium Battery Cathode**

## Section 1: Identification

### 1.1 Product Identifier

- **Product Name:** EMD Powder for Primary Lithium Battery Cathode
- **Chemical Name:** Manganese Dioxide ($MnO_2$)
- **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 Use:** Cathode material for primary lithium batteries (e.g., Li-$MnO_2$ coin, button, and cylindrical cells).
- **Uses Advised Against:** No specific uses advised against are identified.

### 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/WhatsApp:** +8618273793022

### 1.4 Emergency Telephone Number

- **Emergency Phone:** +8618273793022 (Available during business hours)

# Section 2: Hazard(s) Identification

## 2.1 Classification of the Substance or Mixture

**GHS Classification (United States)**

- Acute toxicity, Oral (Category 4) [1]
- Acute toxicity, Inhalation (Category 4) [1]
- Specific target organ toxicity - Repeated exposure (Category 2) (Brain) [1]

## 2.2 GHS Label Elements, Including Precautionary Statements

**Pictogram(s):**


GHS07 - Exclamation Mark

**Signal Word:** Warning

**Hazard Statement(s):**

- H302: Harmful if swallowed [1]
- H332: Harmful if inhaled [1]
- H373: May cause damage to organs (Brain) through prolonged or repeated exposure [1]

**Precautionary Statement(s):**

- **Prevention:**
  - P260: Do not breathe dust/fume/gas/mist/vapors/spray.
  - P264: Wash 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/doctor 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/doctor if you feel unwell.
    - P314: Get medical advice/attention if you feel unwell.
- **Disposal:**
    - P501: Dispose of contents/container to an approved waste disposal plant.

### 2.3 Hazards Not Otherwise Classified (HNOC) or Not Covered by GHS

- Fine dust may cause mechanical irritation to eyes and respiratory tract.

## Section 3: Composition/Information on Ingredients

### 3.1 Substances

| Chemical Name | Common Name | CAS No. | EC No. | Concentration (%) |
|---|---|---|---|---|
| Manganese Dioxide | EMD, Pyrolusite | 1313-13-9 | 215-202-6 | ≥ 99.5 |

## Section 4: First-aid Measures

### 4.1 Description of Necessary 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/Effects, Both Acute and Delayed

- **Acute:** Harmful if swallowed or inhaled. May cause irritation to eyes, skin, and respiratory tract. Symptoms may include coughing, shortness of breath, and irritation.
- **Delayed:** Prolonged or repeated exposure to manganese dusts or fumes may affect the central nervous system, leading to a condition known as Manganism. Symptoms can include neurological effects such as tremors, difficulty walking, and psychological disturbances [1].

### 4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

- Treat symptomatically. For severe cases of inhalation or ingestion, seek immediate medical attention. Specific antidotes are generally not available; treatment is supportive.

## Section 5: Fire-fighting Measures

### 5.1 Suitable Extinguishing Media

- **Suitable:** Use water spray, alcohol-resistant foam, dry chemical, or carbon dioxide. Product is not flammable.
- **Unsuitable:** No limitations on extinguishing media for the substance itself.

### 5.2 Specific Hazards Arising from the Substance or Mixture

- **Hazardous Combustion Products:** Manganese oxides.
- **Specific Hazards:** Not considered a fire hazard. Non-combustible. However, in a fire, containers may rupture due to pressure buildup.

### 5.3 Special Protective Equipment and Precautions for Firefighters

- Wear self-contained breathing apparatus (SCBA) for firefighting if necessary.
- Wear full protective clothing to prevent contact with skin and eyes.

## Section 6: Accidental Release Measures

### 6.1 Personal Precautions, Protective Equipment and Emergency Procedures

- **For Non-Emergency Personnel:** Avoid dust formation. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Refer to section 8 for personal protective equipment.
- **For Emergency Responders:** Wear appropriate personal protective equipment (respiratory protection, gloves, eye protection) as described in Section 8.

### 6.2 Environmental Precautions

- Do not let product enter drains. Do not allow to enter into soil/subsoil. Prevent further leakage or spillage if safe to do so.

### 6.3 Methods and Materials 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:** Ventilate area and wash spill site after material pickup is complete.

## Section 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. For precautions see section 2.2.

### 7.2 Conditions for Safe Storage, Including Any Incompatibilities

- **Storage Conditions:** Keep container tightly closed in a dry and well-ventilated place. Store in a cool, dry, and dark place. Keep away from strong acids and reducing agents.

- **Incompatibilities:** Strong acids, strong reducing agents.

# Section 8: Exposure Controls/Personal Protection

## 8.1 Control Parameters

### Occupational Exposure Limits (OELs)

| Component | CAS No. | Value | Control Parameters | Basis |
|---|---|---|---|---|
| Manganese Dioxide | 1313-13-9 | TWA | 0.02 mg/m³ (respirable fraction) | ACGIH TLV (2020) [2] |
| | | TWA | 0.1 mg/m³ (inhalable fraction) | ACGIH TLV (2020) [2] |
| | | TWA | 5 mg/m³ (as Mn, fume) | OSHA PEL (1989) [3] |
| | | Ceiling | 5 mg/m³ (as Mn, fume) | NIOSH REL (1994) [4] |

## 8.2 Appropriate Engineering Controls

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

## 8.3 Individual Protection Measures, Such as Personal Protective Equipment (PPE)

- **Eye/Face Protection:** Safety glasses with side-shields conforming to EN166 or equivalent. 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. Full contact material: Nitrile rubber, minimum layer thickness 0.11 mm, break through time 480 min. Splash contact material: Nitrile rubber, minimum layer thickness 0.11 mm, break through time 480 min.

- **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).

# Section 9: Physical and Chemical Properties

## 9.1 Information on Basic Physical and Chemical Properties

| Property | Value |
|---|---|
| **Appearance** | Black powder |
| **Odor** | Odorless |
| **Odor Threshold** | Not applicable |
| **pH (1% aqueous)** | 6.5 - 8.0 [5] |
| **Melting Point/Freezing Point** | ~535 °C (Decomposes) [6] |
| **Initial Boiling Point and Range** | Not applicable (Decomposes) |
| **Flash Point** | Not applicable |
| **Evaporation Rate** | Not applicable |
| **Flammability (solid, gas)** | Non-flammable |
| **Upper/Lower Flammability Limit** | Not applicable |
| **Vapor Pressure** | Not applicable |
| **Vapor Density** | Not applicable |
| **Relative Density** | 5.026 g/cm$^3$ (at 25 °C) [6] |
| **Water Solubility** | Insoluble [6] |
| **Partition Coefficient** | Not applicable |
| **Auto-ignition Temperature** | Not applicable |
| **Decomposition Temperature** | ~535 °C [6] |
| **Viscosity** | Not applicable (Solid) |
| **Particle Size (D50)** | 3 - 8 µm [5] |
| **Surface Area (BET)** | 50 - 120 m$^2$/g [5] |

| Property | Value |
|---|---|
| **Tap Density** | 0.4 - 0.6 g/cm$^3$ [5] |

# Section 10: Stability and Reactivity

## 10.1 Reactivity

- No dangerous reaction known under conditions of normal use.

## 10.2 Chemical Stability

- Stable under recommended storage conditions.

## 10.3 Possibility of Hazardous Reactions

- Reacts with strong reducing agents and strong acids, potentially generating heat or toxic gases.

## 10.4 Conditions to Avoid

- Exposure to incompatible materials, dust formation.

## 10.5 Incompatible Materials

- Strong acids, strong reducing agents.

## 10.6 Hazardous Decomposition Products

- Under fire conditions: Manganese oxides. Other decomposition products not known.

# Section 11: Toxicological Information

## 11.1 Information on Toxicological Effects

- **Acute Toxicity:**
  - **Oral LD50:** Rat: >3478 mg/kg [7], 9000 mg/kg 8
  - **Inhalation LC50:** No data available for Manganese Dioxide specifically, but classified as harmful if inhaled (Category 4) based on general manganese compounds [1].
  - **Dermal LD50:** No data available.
- **Skin Corrosion/Irritation:** No data available. Based on available information, not classified as a skin irritant.
- **Serious Eye Damage/Irritation:** No data available. May cause mechanical irritation due to dust.
- **Respiratory or Skin Sensitization:** No data available.
- **Germ Cell Mutagenicity:** No data available.
- **Carcinogenicity:**
  - IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
  - NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
  - OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.
- **Reproductive Toxicity:** No data available.
- **STOT-Single Exposure:** No data available.
- **STOT-Repeated Exposure:** May cause damage to organs (Brain) through prolonged or repeated exposure [1]. Chronic manganese poisoning primarily involves the central nervous system [9].
- **Aspiration Hazard:** No data available.

# Section 12: Ecological Information

## 12.1 Ecotoxicity

- **Toxicity to Fish:** No data available.
- **Toxicity to Daphnia and Other Aquatic Invertebrates:** No data available.
- **Toxicity to Algae:** No data available.
- **General:** Manganese is a naturally occurring element. However, excessive concentrations can be harmful to aquatic life. Avoid release to the environment.

## 12.2 Persistence and Degradability

- Manganese dioxide is an inorganic compound and is not expected to be biodegradable.

## 12.3 Bioaccumulative Potential

- Manganese can bioaccumulate in some organisms, but the bioaccumulation potential of manganese dioxide specifically is low due to its insolubility.

## 12.4 Mobility in Soil

- Due to its low solubility, manganese dioxide is expected to have low mobility in soil.

## 12.5 Other Adverse Effects

- No other adverse environmental effects are expected from this product.

# Section 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.

## Section 14: Transport Information

### 14.1 UN Number

- **ADR/RID:** Not regulated as dangerous goods.
- **IMDG:** Not regulated as dangerous goods.
- **IATA:** Not regulated as dangerous goods.

### 14.2 UN Proper Shipping Name

- **ADR/RID:** Not applicable
- **IMDG:** Not applicable
- **IATA:** Not applicable

### 14.3 Transport Hazard Class(es)

- **ADR/RID:** Not applicable
- **IMDG:** Not applicable
- **IATA:** Not applicable

### 14.4 Packing Group

- **ADR/RID:** Not applicable
- **IMDG:** Not applicable
- **IATA:** Not applicable

### 14.5 Environmental Hazards

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

- **IATA:** No

### 14.6 Special Precautions for User

- No special precautions indicated.

## Section 15: Regulatory Information

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

- **United States:**
    - **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 (Category N450) - CAS No. 1313-13-9 (Manganese Dioxide) is part of this category.
    - **SARA $^{311}/_{312}$ Hazards:** Acute Health Hazard, Chronic Health Hazard.
    - **Massachusetts Right To Know Components:** No components are subject to the Massachusetts Right to Know Act.
    - **Pennsylvania Right To Know Components:** Manganese Dioxide (CAS No. 1313-13-9).
    - **New Jersey Right To Know Components:** Manganese Dioxide (CAS No. 1313-13-9).
    - **California Prop. 65 Components:** This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
- **European Union:**
    - **REACH Status:** This substance is registered under REACH.
    - **ECHA C&L Inventory:** Classified as Acute Tox. 4 (H302, H332), STOT RE 2 (H373) [1].

# Section 16: Other Information

## 16.1 Date of Preparation or Last Revision

- **Date of Preparation:** February 05, 2026
- **Revision Number:** 1.0

## 16.2 Key/Legend to Abbreviations and Acronyms Used in the SDS

- **ACGIH:** American Conference of Governmental Industrial Hygienists
- **ADR:** European Agreement concerning the International Carriage of Dangerous Goods by Road
- **CAS:** Chemical Abstracts Service
- **EC No.:** European Community Number
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **IARC:** International Agency for Research on Cancer
- **IATA:** International Air Transport Association
- **IMDG:** International Maritime Dangerous Goods
- **LC50:** Lethal Concentration 50%
- **LD50:** Lethal Dose 50%
- **LOI:** Loss on Ignition
- **$MnO_2$:** Manganese Dioxide
- **MSDS:** Material Safety Data Sheet
- **NIOSH:** National Institute for Occupational Safety and Health
- **NTP:** National Toxicology Program
- **OEL:** Occupational Exposure Limit
- **OSHA:** Occupational Safety and Health Administration
- **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
- **SARA:** Superfund Amendments and Reauthorization Act
- **SCBA:** Self-Contained Breathing Apparatus
- **STOT:** Specific Target Organ Toxicity
- **TLV:** Threshold Limit Value
- **TWA:** Time-Weighted Average
- **UN:** United Nations