# SAFETY DATA SHEET

**SECTION 1: Identification of the substance/mixture and of the company/undertaking**

## 1.1 Product identifier

- **Product Name:** Chemical Manganese Dioxide (CMD)
- **Chemical Formula:** $MnO_2$
- **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 uses:** Primarily used in Li-$MnO_2$ primary batteries.
- **Uses advised against:** No specific uses advised against.

## 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: Hazards identification**

## 2.1 Classification of the substance or mixture

- **GHS Classification:**
  - Acute toxicity, Oral (Category 4), H302
  - Acute toxicity, Inhalation (Category 4), H332
  - Specific target organ toxicity - repeated exposure, Inhalation (Category 2), Brain, H373

## 2.2 Label elements

- **Signal Word:** Warning
- **Hazard Statements:**
  - H302 + H332: Harmful if swallowed or if inhaled.
  - H373: May cause damage to organs (Brain) through prolonged or repeated exposure if inhaled.
- **Precautionary Statements:**
  - 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.
  - 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.
  - P501: Dispose of contents/container to an approved waste disposal plant.

## 2.3 Other hazards

- Fine dust may cause mechanical irritation to eyes and respiratory tract.
- Prolonged or repeated inhalation of manganese dust may lead to manganism, a neurological disorder.

**SECTION 3: Composition/information on ingredients**

## 3.1 Substances

| Chemical Name | CAS No. | EC No. | Concentration (%) |
|---|---|---|---|
| Manganese Dioxide (CMD) | 1313-13-9 | 215-202-6 | 91.0 – 93.5 |

## 3.2 Mixtures

Not applicable.

**SECTION 4: First aid measures**

## 4.1 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.

## 4.2 Most important symptoms and effects, both acute and delayed

- May cause mechanical irritation to eyes and respiratory tract.

## 4.3 Indication of any immediate medical attention and special treatment needed

- Treat symptomatically.

**SECTION 5: Firefighting measures**

## 5.1 Extinguishing media

- **Suitable extinguishing media:** Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.
- **Unsuitable extinguishing media:** No information available.

## 5.2 Special hazards arising from the substance or mixture

- May emit toxic fumes of manganese oxides under fire conditions.

## 5.3 Advice for firefighters

- Wear self-contained breathing apparatus for firefighting if necessary.

**SECTION 6: Accidental release measures**

## 6.1 Personal precautions, protective equipment and emergency procedures

- Use personal protective equipment. Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation.

## 6.2 Environmental precautions

- Do not let product enter drains.

## 6.3 Methods and material for containment and cleaning up

- Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.

## 6.4 Reference to other sections

- For disposal considerations, see Section 13.

**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.

## 7.2 Conditions for safe storage, including any incompatibilities

- Keep container tightly closed in a dry and well-ventilated place. Store in a cool, dry place.

## 7.3 Specific end use(s)

- Apart from the uses mentioned in Section 1.2, no other specific uses are stipulated.

**SECTION 8: Exposure controls/personal protection**

## 8.1 Control parameters

- **Occupational exposure limits:** Consult local regulatory authorities for specific occupational exposure limits for manganese dioxide.

## 8.2 Exposure controls

### 8.2.1 Appropriate engineering controls

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

### 8.2.2 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.
- **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).

**SECTION 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 (995 °F) - decomposes
- **Initial boiling point and boiling range:** Not applicable
- **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:** 5.026 g/cm$^3$ (True density)
- **Water solubility:** Insoluble
- **Partition coefficient: n-octanol/water:** Not applicable
- **Auto-ignition temperature:** Not applicable
- **Decomposition temperature:** > 535 °C
- **Viscosity:** Not applicable

- **Explosive properties:** Not explosive
- **Oxidizing properties:** Not oxidizing
- **Molecular Weight:** 86.94 g/mol

## 9.2 Other information

- **$MnO_2$ Content:** 91.0 – 93.5 %
- **Crystal Form:** γ-$MnO_2$ (CMD)
- **Moisture (105 °C):** ≤ 0.5 %
- **Fe:** ≤ 0.005 %
- **Cu:** ≤ 0.001 %
- **Ni:** ≤ 0.001 %
- **Pb:** ≤ 0.002 %
- **$SO_4^{2-}$:** ≤ 0.3 %
- **Tap Density:** 1.8 – 2.3 g/$cm^3$
- **BET Surface Area:** 25 – 45 $m^2$/g
- **Particle Size (D50):** 8 – 20 µm

**SECTION 10: Stability and reactivity**

## 10.1 Reactivity

- No data available.

## 10.2 Chemical stability

- Stable under recommended storage conditions.

## 10.3 Possibility of hazardous reactions

- No data available.

## 10.4 Conditions to avoid

- Avoid dust formation.

## 10.5 Incompatible materials

- Strong reducing agents.

## 10.6 Hazardous decomposition products

- Other decomposition products - No data available.
- In the event of fire: see Section 5.

**SECTION 11: Toxicological information**

## 11.1 Information on toxicological effects

- **Acute Oral Toxicity (LD50):** > 3478 mg/kg (Rat)
- **Acute Inhalation Toxicity (LC50):** No direct LC50 for $MnO_2$ powder, but manganese compounds are considered harmful if inhaled.
- **Acute Dermal Toxicity (LD50):** > 2000 mg/kg (Rat)
- **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:** No data available.
- **Reproductive toxicity:** No data available.

- **STOT-single exposure:** No data available.
- **STOT-repeated exposure:** May cause damage to the central nervous system (brain) through prolonged or repeated inhalation exposure (Manganism).
- **Aspiration hazard:** No data available.

**SECTION 12: Ecological information**

## 12.1 Toxicity

- **Toxicity to fish:** No data available (MnO2 is highly insoluble).

## 12.2 Persistence and degradability

- **Persistence and degradability:** Inorganic substance, not applicable for biodegradability.

## 12.3 Bioaccumulative potential

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

## 12.4 Mobility in soil

- **Mobility in soil:** Insoluble in water; low mobility in soil.

## 12.5 Results of PBT and vPvB assessment

- This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

## 12.6 Other adverse effects

- No data available.

**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.
- **Contaminated packaging:** Dispose of as unused product.

**SECTION 14: Transport information**

## 14.1 UN number

- Not regulated as a hazardous material for transport.

## 14.2 UN proper shipping name

- Not applicable.

## 14.3 Transport hazard class(es)**

- Not applicable.

## 14.4 Packing group

- Not applicable.

## 14.5 Environmental hazards

- Not a marine pollutant.

## 14.6 Special precautions for user

- No data available.

## 14.7 Transport in bulk according to Annex II of MARPOL $^{73}/_{78}$ and the IBC Code

- Not applicable.

**SECTION 15: Regulatory information**

## 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

- **European Union Regulations:** REACH, CLP, etc. (Specific regulations may apply depending on region)
- **United States Regulations:** OSHA, TSCA, SARA, etc. (Specific regulations may apply depending on region)

## 15.2 Chemical safety assessment

- For this product a chemical safety assessment was not carried out.

**SECTION 16: Other information**

## 16.1 Date of preparation or last revision

- **Date of Preparation:** 2026-02-04

## 16.2 Abbreviations and acronyms

- **CAS:** Chemical Abstracts Service
- **EC:** European Community
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **CMD:** Chemical Manganese Dioxide
- **Li-$MnO_2$:** Lithium Manganese Dioxide
- **PPE:** Personal Protective Equipment
- **STOT:** Specific Target Organ Toxicity
- **PBT:** Persistent, Bioaccumulative and Toxic
- **vPvB:** very Persistent and very Bioaccumulative
- **UN:** United Nations
- **MARPOL:** International Convention for the Prevention of Pollution from Ships
- **IBC Code:** International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
- **REACH:** Registration, Evaluation, Authorisation and Restriction of Chemicals
- **CLP:** Classification, Labelling and Packaging
- **OSHA:** Occupational Safety and Health Administration
- **TSCA:** Toxic Substances Control Act
- **SARA:** Superfund Amendments and Reauthorization Act

## 16.3 Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.