Material Safety Data Sheet (MSDS)

According to Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

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

1.1 Product Identifier

- **Product Name:** High Purity Battery Grade Manganese Sulfate Monohydrate
- **Chemical Name:** Manganese(II) Sulfate Monohydrate
- **CAS No:** 10034-96-5
- **EC No:** 232-089-9
- **Molecular Formula:** $MnSO_4 \cdot H_2O$

1.2 Relevant identified uses of the substance or mixture and uses advised against

- **Identified Uses:** Lithium-ion cathode materials (LFP, LMFP synthesis), solid-state battery research, energy storage systems, precursor chemicals, electrolytic manganese production.
- **Uses Advised Against:** Not for food or drug use.

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
- **Phone/WhatsApp:** +8618273793022
- **Email:** lixifirm@outlook.com

- **Website:** manganesesupply.com

1.4 Emergency telephone number

- **Emergency Phone:** +8618273793022

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

- **Specific target organ toxicity - repeated exposure (Category 2):** H373
- **Serious eye damage (Category 1):** H318
- **Hazardous to the aquatic environment, long-term hazard (Category 2):** H411

2.2 GHS Label elements, including precautionary statements

- **Pictograms:** (Health Hazard, Corrosion, Environment)
- **Signal Word:** Danger
- **Hazard Statements:**
  - H318: Causes serious eye damage.
  - H373: May cause damage to organs (Brain) through prolonged or repeated exposure if inhaled.
  - H411: Toxic to aquatic life with long lasting effects.
- **Precautionary Statements:**
  - P260: Do not breathe dust/fume/gas/mist/vapors/spray.
  - P273: Avoid release to the environment.
  - P280: Wear protective gloves/protective clothing/eye protection/face protection.
  - P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - P310: Immediately call a POISON CENTER/doctor.

- P391: Collect spillage.
- P501: Dispose of contents/container to an approved waste disposal plant.

SECTION 3: Composition/information on ingredients

3.1 Substances

- **Chemical Identity:** Manganese Sulfate Monohydrate
- **Synonyms:** Manganese(II) sulfate monohydrate, Manganous sulfate monohydrate
- **CAS No:** 10034-96-5
- **Purity:** ≥ 99% (Mn Content: 32–33%)
- **Impurities:**
  - Iron (Fe): ≤ 0.005%
  - Calcium (Ca): ≤ 0.01%
  - Magnesium (Mg): ≤ 0.01%
  - Lead (Pb): ≤ 1 ppm
  - Copper (Cu): ≤ 1 ppm
  - Zinc (Zn): ≤ 1 ppm
  - Moisture: ≤ 0.5%

SECTION 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

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11. Men exposed to manganese dusts showed a decrease in fertility. Chronic manganese poisoning primarily involves the central nervous system.

SECTION 5: Fire-fighting measures

5.1 Extinguishing media

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

5.2 Special hazards arising from the substance or mixture

- Sulfur oxides, Manganese/manganese oxides. Not combustible. Ambient fire may liberate hazardous vapors.

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 vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.

6.2 Environmental precautions

- Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

6.3 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.

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

- Store in cool place. Keep container tightly closed in a dry and well-ventilated place.
- Hygroscopic. Keep in a dry place (Moisture $\leq$ 0.5%).
- **Packaging:** 25 kg kraft paper bags with PE liner.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

- **Components with workplace control parameters:**
  - Manganese and inorganic compounds (as Mn): TWA 0.2 mg/m^3 (inhalable fraction), 0.02 mg/m^3 (respirable fraction) [ACGIH].

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.
- **Personal Protective Equipment:**
  - **Eye/Face Protection:** Face shield and safety glasses.
  - **Skin Protection:** Handle with gloves. Gloves must be inspected prior to use.
  - **Body Protection:** Complete suit protecting against chemicals.
  - **Respiratory Protection:** Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

- **Appearance:** Form: powder (100–200 mesh), Color: pale pink
- **Odor:** Odorless
- **Odor Threshold:** No data available
- **pH:** 3.0 - 3.5 at 50 g/l at 20 °C
- **Melting Point/Freezing Point:** Melting point/range: 700 °C
- **Initial Boiling Point and Boiling Range:** No data available

- **Flash Point:** Not applicable
- **Evaporation Rate:** No data available
- **Flammability (solid, gas):** The product is not flammable.
- **Upper/Lower Flammability or Explosive Limits:** No data available
- **Vapor Pressure:** No data available
- **Vapor Density:** No data available
- **Relative Density (Bulk Density):** 1.0–1.3 g/cm^3
- **Water Solubility:** Soluble
- **Partition Coefficient: n-octanol/water:** No data available
- **Auto-ignition Temperature:** No data available
- **Decomposition Temperature:** > 850 °C
- **Viscosity:** No data available
- **Explosive Properties:** No data available
- **Oxidizing Properties:** No data available

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 moisture.

10.5 Incompatible materials

- Strong oxidizing agents.

10.6 Hazardous decomposition products

- Hazardous decomposition products formed under fire conditions: Sulfur oxides, Manganese/manganese oxides.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

- **Acute Toxicity:** LD50 Oral - Rat - 2,150 mg/kg (Manganese sulfate monohydrate)
- **Skin Corrosion/Irritation:** No data available.
- **Serious Eye Damage/Eye Irritation:** Risk of serious damage to eyes.
- **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.
- **Reproductive Toxicity:** No data available.
- **Specific Target Organ Toxicity - Single Exposure:** No data available.
- **Specific Target Organ Toxicity - Repeated Exposure:** May cause damage to organs through prolonged or repeated exposure. - Brain.
- **Aspiration Hazard:** No data available.

SECTION 12: Ecological information

12.1 Toxicity

- **Toxicity to fish:** No data available.

- **Toxicity to daphnia and other aquatic invertebrates:** No data available.
- **Toxicity to algae:** No data available.

12.2 Persistence and degradability

- The methods for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential

- No data available.

12.4 Mobility in soil

- No data available.

12.5 Results of PBT and vPvB assessment

- PBT/vPvB assessment not available as chemical safety assessment not required/not conducted.

12.6 Other adverse effects

- Toxic to aquatic life with long lasting effects.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

- **Product:** Offer surplus and non-recyclable solutions to a licensed disposal company. 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: 3077
- IMDG: 3077
- IATA: 3077

14.2 UN proper shipping name

- ADR/RID: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese sulfate monohydrate)
- IMDG: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (Manganese sulfate monohydrate)
- IATA: Environmentally hazardous substance, solid, n.o.s. (Manganese sulfate monohydrate)

14.3 Transport hazard class(es)

- ADR/RID: 9
- IMDG: 9
- IATA: 9

14.4 Packaging group

- ADR/RID: III
- IMDG: III
- IATA: III

14.5 Environmental hazards

- ADR/RID: yes
- IMDG Marine pollutant: yes
- IATA: yes

14.6 Special precautions for user

- Further information: EHS-Mark required (ADR 2.2.9.1.10, IMDG code 2.10.3) for single packagings and combination packagings containing inner packagings with Dangerous Goods > 5L for liquids or > 5kg for solids.

SECTION 15: Regulatory information

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

- This safety datasheet complies with the requirements of Regulation (EC) No. $^{1907}/_{2006}$.

15.2 Chemical safety assessment

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

SECTION 16: Other information

- **Further Information:** The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. BTLnewmaterial and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product.
- **Preparation Date:** March 31, 2026