SAFETY DATA SHEET (SDS)

Manganese Sulfate Monohydrate ($MnSO_4 \cdot H_2O$)

Issue Date: 2026-04-09

Revision Date: 2026-04-09

Version: 1.0

SECTION 1: Identification of the Substance/Mixture and of the Company/Undertaking

1.1 Product Identifier

- **Product Name:** Manganese Sulfate Monohydrate
- **Chemical Formula:** $MnSO_4 \cdot H_2O$
- **CAS No.:** 10034-96-5
- **EC No.:** 232-089-9
- **REACH Registration No.:** (If available, to be provided by manufacturer)

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

- **Identified Uses:** Micronutrient fertilizer, animal feed additive, chemical reagent, ceramic glazes, textile dyeing, fungicide.
- **Uses Advised Against:** Not for direct human consumption. Avoid uses not specified by the manufacturer.

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
- **Website:** manganesesupply.com

1.4 Emergency Telephone Number

- **Emergency Phone:** +8618273793022 (24 hours)

SECTION 2: Hazards Identification

2.1 Classification of the Substance or Mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS) and Regulation (EC) No $^{1272}/_{2008}$ (CLP):

- **Specific target organ toxicity - repeated exposure (Category 2)** [H373: May cause damage to organs (e.g., central nervous system) through prolonged or repeated exposure if inhaled or ingested].
- **Serious Eye Damage/Eye Irritation (Category 1)** [H318: Causes serious eye damage].
- **Hazardous to the aquatic environment - Chronic Aquatic Toxicity (Category 2)** [H411: Toxic to aquatic life with long lasting effects].

2.2 Label Elements

Pictograms:

- GHS08 (Health Hazard)
- GHS05 (Corrosion)
- GHS09 (Environment)

Signal Word: Danger

Hazard Statements:

- H318: Causes serious eye damage.
- H373: May cause damage to organs (e.g., central nervous system) through prolonged or repeated exposure.
- H411: Toxic to aquatic life with long lasting effects.

Precautionary Statements:

- **Prevention:**
  - P260: Do not breathe dust/fume/gas/mist/vapors/spray.
  - P264: Wash thoroughly after handling.
  - P273: Avoid release to the environment.
  - P280: Wear protective gloves/protective clothing/eye protection/face protection.
- **Response:**
  - P305 + P351 + P338 + P310: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
  - P314: Get medical advice/attention if you feel unwell.
  - P391: Collect spillage.
- **Storage:**
  - No specific storage statements.
- **Disposal:**
  - P501: Dispose of contents/container in accordance with local/regional/national/international regulations.

2.3 Other Hazards

- **Potential for dust generation:** Fine dust may cause respiratory irritation.
- **Environmental hazard:** Harmful to aquatic organisms.

SECTION 3: Composition/Information on Ingredients

3.1 Substances

- **Chemical Name:** Manganese Sulfate Monohydrate
- **Common Name/Synonyms:** Manganous sulfate monohydrate, Manganese(II) sulfate monohydrate
- **CAS No.:** 10034-96-5
- **EC No.:** 232-089-9
- **Concentration:** ≥ 98% (Typical)

3.2 Mixtures

Not applicable (product is a substance).

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. Move out of dangerous area.
- **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 if irritation develops and persists.
- **In Case of Eye Contact:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/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

- **Acute:** Causes serious eye damage. May cause respiratory tract irritation. Ingestion may cause gastrointestinal irritation, nausea, vomiting, and diarrhea.
- **Delayed:** Prolonged or repeated exposure (especially inhalation) may cause damage to organs, particularly the central nervous system (manganism), leading to neurological symptoms such as tremors, difficulty walking, and psychiatric disturbances.

4.3 Indication of Any Immediate Medical Attention and Special Treatment Needed

- **Treatment:** Treat symptomatically. Medical observation is recommended for 24-48 hours after overexposure due to the possibility of delayed onset of symptoms.

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:** None known.

5.2 Special Hazards Arising from the Substance or Mixture

- **Hazardous Combustion Products:** Sulfur oxides (SOx), Manganese oxides.

5.3 Advice for Firefighters

- **Protective Equipment:** Wear self-contained breathing apparatus (SCBA) for firefighting if necessary. Wear full protective gear.
- **Further Information:** Use water spray to cool unopened containers. Prevent firefighting water from entering surface water or groundwater.

SECTION 6: Accidental Release Measures

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

- **Personal Precautions:** Use personal protective equipment. Avoid dust formation. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust.
- **Emergency Procedures:** Isolate hazard area. Keep unnecessary and unprotected personnel from entering.

6.2 Environmental Precautions

- **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. Collect spillage.

6.3 Methods and Material 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:** Neutralize with a weak acid if necessary. Clean contaminated surfaces thoroughly.

6.4 Reference to Other Sections

- For disposal considerations, see Section 13. For personal protective equipment, see Section 8.

SECTION 7: Handling and Storage

7.1 Precautions for Safe Handling

- **Protective Measures:** Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is

formed. Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling.

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

7.2 Conditions for Safe Storage, Including Any Incompatibilities

- **Storage Conditions:** Store in a cool, dry, well-ventilated area. Keep container tightly closed in a dry and well-ventilated place. Store away from incompatible materials (see Section 10).
- **Incompatible Materials:** Strong oxidizing agents, strong acids, strong bases.

7.3 Specific End Use(s)

- **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:**
  - **Manganese (as Mn):**
    - **OSHA PEL (Permissible Exposure Limit):** 5 mg/m^3 (Ceiling, as Mn)
    - **ACGIH TLV (Threshold Limit Value):** 0.02 mg/m^3 (Respirable fraction, as Mn); 0.1 mg/m^3 (Inhalable fraction, as Mn)
    - **NIOSH REL (Recommended Exposure Limit):** 1 mg/m^3 (TWA, as Mn); 3 mg/m^3 (STEL, as Mn)

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 the workday. 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.

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

SECTION 9: Physical and Chemical Properties

9.1 Information on Basic Physical and Chemical Properties

- **Appearance:** White to pale pink crystalline powder
- **Odor:** Odorless

- **Odor Threshold:** Not applicable
- **pH:** 3.0-3.5 (5% solution at 25°C) (Estimated)
- **Melting Point/Freezing Point:** 700 °C (1,292 °F) (Decomposes) (Anhydrous MnSO4)
- **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:** 2.95 g/cm³ (Anhydrous MnSO4) (Estimated)
- **Bulk Density:** 0.9–1.3 g/cm³ (as per product specification)
- **Water Solubility:** Soluble (approx. 105 g/100 mL at 20°C) (Anhydrous MnSO4)
- **Partition Coefficient: n-octanol/water:** Not applicable
- **Auto-ignition Temperature:** Not applicable
- **Decomposition Temperature:** > 700 °C
- **Viscosity:** Not applicable (solid)
- **Explosive Properties:** Not explosive
- **Oxidizing Properties:** Not oxidizing

9.2 Other Information

- **Molecular Weight:** 169.01 g/mol ($MnSO_4 \cdot H_2O$)

SECTION 10: Stability and Reactivity

10.1 Reactivity

- Stable under recommended storage conditions.

10.2 Chemical Stability

- Stable under normal conditions of use and storage.

10.3 Possibility of Hazardous Reactions

- No hazardous reactions known under normal conditions of use.

10.4 Conditions to Avoid

- Exposure to moisture, extreme temperatures.

10.5 Incompatible Materials

- Strong oxidizing agents, strong acids, strong bases.

10.6 Hazardous Decomposition Products

- Hazardous decomposition products formed under fire conditions: Sulfur oxides (SOx), Manganese oxides. Other decomposition products: No data available.

SECTION 11: Toxicological Information

11.1 Information on Toxicological Effects

- **Acute Toxicity:**
    - **LD50 Oral (Rat):** 2150 mg/kg (Manganese sulfate monohydrate) [1]
    - **LD50 Dermal (Rabbit):** > 2000 mg/kg (Estimated) [1]
    - **LC50 Inhalation (Rat):** No data available. May cause respiratory irritation.
- **Skin Corrosion/Irritation:** May cause mild skin irritation.
- **Serious Eye Damage/Eye Irritation:** Causes serious eye damage (Category 1).
- **Respiratory or Skin Sensitization:** Not classified as a respiratory or skin sensitizer.

- **Germ Cell Mutagenicity:** No data available. Not expected to be mutagenic.
- **Carcinogenicity:**
    - **IARC:** Not classifiable as to its carcinogenicity to humans (Manganese and its inorganic compounds).
    - **NTP:** Not listed.
    - **OSHA:** Not listed.
- **Reproductive Toxicity:** No data available. Not expected to be a reproductive toxicant.
- **STOT-Single Exposure:** May cause respiratory irritation.
- **STOT-Repeated Exposure:** May cause damage to organs (e.g., central nervous system) through prolonged or repeated exposure if inhaled or ingested (Category 2). Chronic exposure to manganese dusts or fumes can lead to manganism, a neurological disorder.
- **Aspiration Hazard:** Not considered an aspiration hazard.

SECTION 12: Ecological Information

12.1 Toxicity

- **Toxicity to Fish:** LC50 - Oncorhynchus mykiss (rainbow trout) - 3.4 mg/L - 96 h (Manganese sulfate monohydrate) [1]
- **Toxicity to Daphnia and Other Aquatic Invertebrates:** EC50 - Daphnia magna (Water flea) - 8.2 mg/L - 48 h (Manganese sulfate monohydrate) [1]
- **Toxicity to Algae:** EC50 - Pseudokirchneriella subcapitata (green algae) - 4.5 mg/L - 72 h (Manganese sulfate monohydrate) [1]

12.2 Persistence and Degradability

- **Biodegradability:** Inorganic substance, not readily biodegradable.

12.3 Bioaccumulative Potential

- **Bioaccumulation:** Manganese is an essential trace element, but excessive levels can accumulate in organisms. Potential for bioaccumulation is low for inorganic manganese compounds in aquatic environments.

12.4 Mobility in Soil

- **Mobility:** Soluble in water, expected to have high mobility in soil.

12.5 Results of PBT and vPvB Assessment

- This substance does not meet the PBT (Persistent, Bioaccumulative, Toxic) or vPvB (very Persistent, very Bioaccumulative) criteria.

12.6 Other Adverse Effects

- Toxic to aquatic life with long lasting effects (H411).

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:** UN 3077
- **IMDG:** UN 3077

- **IATA:** UN 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 Packing 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

- 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

- **USA 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 sulfate monohydrate (CAS No. 10034-96-5) - Concentration: ≥ 98%
    - **SARA $^{311}/_{312}$ Hazards:** Acute Health Hazard, Chronic Health Hazard.
    - **California Prop 65:** This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.
- **EU Regulations:**
    - **Regulation (EC) No $^{1272}/_{2008}$ (CLP):** Classified as per Section 2.
    - **REACH:** This substance is an inorganic substance. (Registration status depends on tonnage and use, typically registered for EU manufacturers/importers).

15.2 Chemical Safety Assessment

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

SECTION 16: Other Information

16.1 Indication of Changes

- First issue.

16.2 Abbreviations and Acronyms

- **ADR:** European Agreement concerning the International Carriage of Dangerous Goods by Road
- **CAS:** Chemical Abstracts Service
- **CLP:** Classification, Labelling and Packaging
- **EC:** European Community
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **IATA:** International Air Transport Association
- **IBC Code:** International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk
- **IMDG:** International Maritime Dangerous Goods
- **LC50:** Lethal Concentration 50%
- **LD50:** Lethal Dose 50%
- **MARPOL:** International Convention for the Prevention of Pollution from Ships
- **MSDS:** Material Safety Data Sheet
- **NIOSH:** National Institute for Occupational Safety and Health
- **OSHA:** Occupational Safety and Health Administration
- **PBT:** Persistent, Bioaccumulative and Toxic
- **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
- **SDS:** Safety Data Sheet
- **STEL:** Short-Term Exposure Limit
- **STOT:** Specific Target Organ Toxicity
- **TDS:** Technical Data Sheet
- **TLV:** Threshold Limit Value
- **TWA:** Time Weighted Average
- **UN:** United Nations
- **vPvB:** very Persistent and very Bioaccumulative

16.3 References

[1] Sigma-Aldrich. (2025). *SAFETY DATA SHEET: Manganese Sulfate Monohydrate*. Retrieved from https://www.sigmaaldrich.com/US/en/sds/sigald/221287
