Safety Data Sheet: Catalytic Manganese Dioxide

1. Identification

Product Identifier: Catalytic Manganese Dioxide

Other means of identification: Manganese Dioxide, MnO_2, Pyrolusite (mineral form)

Recommended use of the chemical and restrictions on use: Recommended Use: Water treatment for iron and manganese removal. Used as a catalytic filtration media. Restrictions on Use: None known.

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: Not available. Contact local emergency services in case of emergency.

2. Hazard(s) Identification

Classification of the substance or mixture: Not classified as hazardous according to the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

GHS label elements, including precautionary statements: No GHS pictograms, signal words, or hazard statements are required.

Hazards not otherwise classified: Fine dust may cause mechanical irritation to eyes, skin, and respiratory tract.

3. Composition/Information on Ingredients

Chemical Name: Manganese Dioxide **Common Name and Synonyms:** Catalytic Manganese Dioxide, MnO_2 **CAS Number:** 1313-13-9 **Concentration:** 75-85 wt% (Manganese Dioxide)

Impurities and Stabilizing Additives: Contains other inert materials as part of the catalytic media, typically silicates or other metal oxides, which are not classified as hazardous.

4. First-Aid Measures

Description of necessary 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 if symptoms persist.
- **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. Remove contact lenses, if present and easy to do. Continue rinsing.
- **Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician if symptoms develop.

Most important symptoms/effects, acute and delayed: Acute: May cause mechanical irritation to eyes, skin, and respiratory tract due to dust. Delayed: Prolonged or repeated exposure to high concentrations of manganese dust may affect the central nervous system, leading to manganism.

Indication of immediate medical attention and special treatment needed: Treat symptomatically. Medical attention should be sought if irritation or symptoms persist or worsen.

5. Fire-Fighting Measures

Suitable extinguishing media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Water spray, dry chemical, foam, or carbon dioxide (CO_2) are suitable.

Specific hazards arising from the chemical: Non-flammable solid. No unusual fire or explosion hazards are expected. Thermal decomposition may produce hazardous fumes of manganese oxides.

Special protective equipment and precautions for fire-fighters: Wear self-contained breathing apparatus (SCBA) for firefighting if necessary. Use personal protective equipment (PPE).

6. Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures: Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Use personal protective equipment as required (see Section 8).

Environmental precautions: Do not let product enter drains. Prevent further leakage or spillage if safe to do so. Do not flush into surface water or sanitary sewer 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. Dispose of in accordance with local regulations.

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. Wash hands thoroughly after handling.

Conditions for safe storage, including any incompatibilities: Keep container tightly closed in a dry and well-ventilated place. Store away from incompatible materials (e.g., strong acids, strong reducing agents).

8. Exposure Controls/Personal Protection

Control parameters: Occupational Exposure Limits (OELs) for Manganese and inorganic Manganese compounds (as Mn):

- **OSHA PEL (Permissible Exposure Limit):** 5 mg/m^3 (ceiling, for manganese compounds)
- **ACGIH TLV (Threshold Limit Value):** 0.02 mg/m^3 (respirable fraction), 0.1 mg/m^3 (inhalable fraction) (for manganese and inorganic manganese compounds)
- **NIOSH REL (Recommended Exposure Limit):** 1 mg/m^3 (TWA, for manganese compounds), 3 mg/m^3 (STEL, for manganese compounds)

Appropriate engineering controls: Handle in accordance with good industrial hygiene and safety practice. Use adequate ventilation to keep airborne concentrations low. If user operations generate dust, fume, or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

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.
- **Skin Protection:** Wear protective gloves (e.g., nitrile rubber, PVC) and suitable protective clothing to prevent skin exposure. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.
- **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 P99 (US) or type P2 (EU EN 143) respirator cartridges. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).
- **Hygiene Measures:** Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. Physical and Chemical Properties

Appearance: Black powder or granules **Odor:** Odorless **Odor Threshold:** Not applicable **pH:** 6.5–9.0 (Operating Range for water treatment, product itself is near neutral to slightly alkaline) **Melting Point/Freezing Point:** Approximately 535 °C (decomposes before melting) [1] **Initial Boiling Point and Boiling Range:** Not applicable (decomposes) **Flash Point:** Not applicable (inorganic solid) **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 (Bulk Density):** 1.8–2.0 g/cm^3 **Solubility(ies):** Insoluble in water; soluble in strong acids with reduction. **Partition Coefficient n-octanol/water:** Not applicable **Auto-ignition Temperature:** Not applicable **Decomposition Temperature:** >535 °C (decomposes to lower manganese oxides and oxygen) [1] **Viscosity:** Not applicable (solid)

10. Stability and Reactivity

Reactivity: Stable under recommended storage conditions.

Chemical Stability: Stable under normal conditions of use and storage.

Possibility of Hazardous Reactions: Reacts with strong acids to produce chlorine gas (if HCl is present) or oxygen. Can act as an oxidizing agent.

Conditions to Avoid: High temperatures, incompatible materials.

Incompatible Materials: Strong acids, strong reducing agents, easily oxidizable materials.

Hazardous Decomposition Products: Manganese oxides, oxygen (at high temperatures).

11. Toxicological Information

Information on the likely routes of exposure: Inhalation: Yes Skin Contact: Yes Eye Contact: Yes Ingestion: Yes

Symptoms related to the physical, chemical, and toxicological characteristics:

- **Inhalation:** May cause respiratory tract irritation, cough, shortness of breath. Prolonged exposure to high concentrations of manganese dust can lead to manganism, a neurological disorder.
- **Skin Contact:** May cause mechanical irritation.
- **Eye Contact:** May cause mechanical irritation, redness, tearing.
- **Ingestion:** May cause gastrointestinal irritation, nausea, vomiting. Large doses can be toxic.

Delayed and immediate effects and also chronic effects from short and long term exposure:

- **Short-term exposure:** Irritation of eyes, skin, and respiratory tract.
- **Long-term exposure:** Chronic inhalation of manganese dust can lead to manganism, characterized by psychiatric disturbances, motor dysfunction (similar to Parkinson's disease), and cognitive impairment.

Numerical measures of toxicity (such as acute toxicity estimates):

- **Acute Oral Toxicity (LD50):** >2000 mg/kg (rat) [2]
- **Acute Dermal Toxicity (LD50):** Not available
- **Acute Inhalation Toxicity (LC50):** Not available

Carcinogenicity: Not classified as a human carcinogen by IARC, NTP, or OSHA.

12. Ecological Information

Ecotoxicity (aquatic and terrestrial): Manganese is a naturally occurring element. Insoluble manganese dioxide is generally considered to have low toxicity to aquatic organisms. However, soluble manganese compounds can be toxic to aquatic life at high concentrations.

Persistence and Degradability: As an inorganic compound, manganese dioxide is not biodegradable. It is persistent in the environment.

Bioaccumulative Potential: Manganese can bioaccumulate in some organisms, but manganese dioxide itself has low bioavailability due to its insolubility.

Mobility in Soil: Low mobility in soil due to its insolubility.

Other Adverse Effects: No other adverse environmental effects are expected from this product.

13. Disposal Considerations

Disposal methods: Dispose of in accordance with local, regional, national, and international regulations. Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Do not dispose of into drains or waterways.

Contaminated Packaging: Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport Information

UN Number: Not regulated **UN Proper Shipping Name:** Not regulated **Transport Hazard Class(es):** Not regulated **Packing Group:** Not regulated **Environmental Hazards:** Not a marine pollutant. **Special Precautions for User:** No special precautions required.

15. Regulatory Information

Safety, health and environmental regulations specific for the product in question:

- **US Federal Regulations:**
  - **TSCA (Toxic Substances Control Act):** All components are listed on the TSCA inventory or are exempt.
  - **CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):** Not applicable.
  - **SARA (Superfund Amendments and Reauthorization Act) Title III:**
    - **Section 302 (Extremely Hazardous Substances):** Not applicable.
    - **Section $^{311}\!/_{312}$ (Hazard Categories):** Not applicable.
    - **Section 313 (Toxic Chemical Release Inventory):** Manganese compounds are reportable under Section 313 (as Manganese

compounds).

- **EU Regulations:**
  - **REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals):** All components are registered or exempt from registration.
  - **CLP (Classification, Labelling and Packaging):** Not classified as hazardous.
- **Other National Regulations:** Consult local regulatory authorities for specific requirements.

16. Other Information

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Key to abbreviations and acronyms:

- **ACGIH:** American Conference of Governmental Industrial Hygienists
- **CAS:** Chemical Abstracts Service
- **CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act
- **CLP:** Classification, Labelling and Packaging
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **IARC:** International Agency for Research on Cancer
- **LD50:** Lethal Dose, 50%
- **LC50:** Lethal Concentration, 50%
- **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
- **REL:** Recommended Exposure Limit
- **SARA:** Superfund Amendments and Reauthorization Act
- **SCBA:** Self-Contained Breathing Apparatus
- **STEL:** Short-Term Exposure Limit
- **TDS:** Technical Data Sheet
- **TLV:** Threshold Limit Value
- **TSCA:** Toxic Substances Control Act
- **TWA:** Time-Weighted Average
- **UN:** United Nations

References: [1] PubChem. Manganese Dioxide. National Library of Medicine. Available at: https://pubchem.ncbi.nlm.nih.gov/compound/Manganese-dioxide [2] Sigma-Aldrich. Manganese(IV) oxide, activated. Safety Data Sheet. Available upon request from Sigma-Aldrich or similar chemical suppliers.