Material Safety Data Sheet (MSDS): Manganese Dioxide for Dehydrogenation Reactions

Section 1: Identification

Product Identifier: Manganese Dioxide for Dehydrogenation Reactions

Other means of identification: Manganese(IV) oxide, Pyrolusite, Activated Manganese Dioxide, MnO_2

Recommended use of the chemical and restrictions on use:

- **Recommended Use:** Oxidative dehydrogenation in organic synthesis, pharmaceutical intermediates, fine chemical manufacturing.
- **Restrictions on Use:** For industrial and laboratory use only. Not for human consumption.

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: Consult local emergency services.

Section 2: Hazard(s) Identification

Classification of the substance or mixture:

- Not classified as hazardous according to GHS criteria. However, prolonged or repeated exposure to dust may cause respiratory irritation.

GHS label elements:

- **Pictograms:** None
- **Signal Word:** None
- **Hazard Statements:** None
- **Precautionary Statements:**
  - **Prevention:** P261 - Avoid breathing dust/fume/gas/mist/vapours/spray. P280 - Wear protective gloves/protective clothing/eye protection/face protection.
  - **Response:** P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - **Storage:** P403 + P233 - Store in a well-ventilated place. Keep container tightly closed.
  - **Disposal:** P501 - Dispose of contents/container in accordance with local/regional/national/international regulations.

Section 3: Composition/Information on Ingredients

Chemical Name	Common Name / Synonyms	CAS Number	Concentration (wt%)
Manganese Dioxide	Manganese(IV) oxide, Pyrolusite, MnO_2	1313-13-9	90.0 – 98.5
Manganese (elemental)	Mn	7439-96-5	60.0 – 63.5
Iron(III) oxide	Ferric oxide, Fe_2O_3	1309-37-1	≤ 0.05
Lead	Pb	7439-92-1	≤ 20 ppm

Section 4: First-Aid Measures

Description of necessary first-aid measures:

- **Inhalation:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. If symptoms persist, call a POISON CENTER or doctor/physician.
- **Skin Contact:** Wash with plenty of soap and water. If skin irritation occurs, get medical advice/attention.
- **Eye Contact:** Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.
- **Ingestion:** Rinse mouth. Do NOT induce vomiting. Get medical advice/attention if you feel unwell.

Most important symptoms/effects, acute and delayed: May cause irritation to eyes, skin, and respiratory tract upon prolonged or repeated exposure to dust.

Indication of immediate medical attention and special treatment needed: Treat symptomatically.

Section 5: Fire-Fighting Measures

Suitable extinguishing media: Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. The product itself is not combustible.

Specific hazards arising from the chemical: Non-combustible. At very high temperatures, manganese oxides may be released.

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

Section 6: Accidental Release Measures

Personal precautions, protective equipment, and emergency procedures: Avoid dust formation. Avoid breathing dust. Ensure adequate ventilation. Wear appropriate personal protective equipment (refer to Section 8).

Environmental precautions: Do not let product enter drains. Prevent further leakage or spillage if safe to do so.

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

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. Normal measures for preventive fire protection.

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

Section 8: Exposure Controls/Personal Protection

Control parameters:

- **Occupational Exposure Limits (OELs):**
  - **OSHA PEL (Permissible Exposure Limit):** Manganese compounds (as Mn) - Ceiling 5 mg/m^3
  - **ACGIH TLV (Threshold Limit Value):** Manganese, elemental and inorganic compounds (as Mn) - TWA 0.02 mg/m^3 (respirable fraction), 0.1 mg/m^3 (inhalable fraction)
  - **NIOSH REL (Recommended Exposure Limit):** Manganese compounds (as Mn) - TWA 1 mg/m^3, STEL 3 mg/m^3

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

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. Wash and dry hands. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.
- **Body protection:** Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. 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

Property	Value
Appearance	Black powder
Odor	Odorless
Odor Threshold	Not applicable
pH	Not available (typically neutral)
Melting point/freezing point	~535 °C (decomposes) [1]
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	5.026 g/cm^3 [1]
Solubility(ies)	Insoluble in water
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	~535 °C [1]
Viscosity	Not applicable (solid)
Explosive properties	Not explosive
Oxidizing properties	Oxidizing agent

Property	Value
Bulk density	0.4 – 1.1 g/cm^3

Section 10: Stability and Reactivity

Reactivity: Stable under recommended storage conditions.

Chemical stability: Stable under normal conditions.

Possibility of hazardous reactions: Reacts with strong reducing agents and strong acids.

Conditions to avoid: High temperatures (above decomposition temperature), incompatible materials.

Incompatible materials: Strong reducing agents, strong acids.

Hazardous decomposition products: Manganese oxides (at high temperatures).

Section 11: Toxicological Information

Information on toxicological effects:

- **Acute toxicity:**
  - **Oral LD50 (rat):** > 2,000 mg/kg (Manganese Dioxide) [2]
  - **Dermal LD50 (rabbit):** > 2,000 mg/kg (Manganese Dioxide) [2]
  - **Inhalation LC50 (rat):** > 5.1 mg/L (4h) (Manganese Dioxide) [2]
- **Skin corrosion/irritation:** May cause mild irritation.
- **Serious eye damage/irritation:** May cause mild irritation.
- **Respiratory or skin sensitization:** Not expected to be a sensitizer.
- **Germ cell mutagenicity:** No data available.
- **Carcinogenicity:** Not classified as a carcinogen by IARC, NTP, OSHA, or ACGIH.
- **Reproductive toxicity:** No data available.
- **STOT-single exposure:** May cause respiratory irritation.

- **STOT-repeated exposure:** Prolonged or repeated inhalation of manganese dust may cause manganism, a neurological disorder.
- **Aspiration hazard:** Not an aspiration hazard.

Section 12: Ecological Information

Toxicity:

- **Fish (LC50):** No data available.
- **Daphnia (EC50):** No data available.
- **Algae (EC50):** No data available.

Persistence and degradability: Inorganic substance, not biodegradable.

Bioaccumulative potential: Manganese can bioaccumulate in some organisms, but significant bioaccumulation in the food chain is generally not expected for manganese dioxide.

Mobility in soil: Low mobility in soil.

Other adverse effects: No known significant effects or critical hazards.

Section 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. Furthermore, generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

Section 14: Transport Information

UN number: Not regulated as a hazardous material for transport.

UN proper shipping name: Not applicable.

Transport hazard class(es): Not applicable.

Packing group: Not applicable.

Environmental hazards: Not a marine pollutant.

Special precautions for user: No special precautions required.

Section 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 from listing.
  - **CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):** Not applicable.
  - **SARA 313 (Superfund Amendments and Reauthorization Act):** Manganese compounds are subject to reporting requirements of Section 313 of SARA Title III and 40 CFR Part 372.
- **EU Regulations:**
  - **REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals):** All components are pre-registered or registered under REACH.
  - **CLP (Classification, Labelling and Packaging):** Not classified as hazardous.

Section 16: Other Information

Date of preparation or last revision: February 10, 2026

Key to abbreviations and acronyms:

- **CAS:** Chemical Abstracts Service
- **GHS:** Globally Harmonized System of Classification and Labelling of Chemicals
- **LD50:** Lethal Dose, 50%
- **LC50:** Lethal Concentration, 50%
- **EC50:** Effective Concentration, 50%

- **OEL:** Occupational Exposure Limit
- **PEL:** Permissible Exposure Limit
- **TLV:** Threshold Limit Value
- **TWA:** Time-Weighted Average
- **STEL:** Short-Term Exposure Limit
- **TSCA:** Toxic Substances Control Act
- **SARA:** Superfund Amendments and Reauthorization Act
- **REACH:** Registration, Evaluation, Authorisation and Restriction of Chemicals
- **CLP:** Classification, Labelling and Packaging

References: [1] PubChem. Manganese Dioxide. National Center for Biotechnology Information. Available at: https://pubchem.ncbi.nlm.nih.gov/compound/Manganese-dioxide [2] ECHA (European Chemicals Agency). Manganese dioxide. Available at: https://echa.europa.eu/registration-dossier/-/registered-dossier/15393/1