

# Material Safety Data Sheet (MSDS)

## High Surface Area Manganese Dioxide for Gas Phase Catalysis

Compliant with GHS (Globally Harmonized System) and OSHA Regulations

### Section 1: Identification

#### 1.1 Product Identification

| Field            | Information   |
|------------------|---|
| Product Name     | High Surface Area Manganese Dioxide for Gas Phase Catalysis |
| Product Code     | MnO <sub>2</sub> -HSA-CAT                                   |
| Chemical Name    | Manganese Dioxide   |
| Chemical Formula | MnO <sub>2</sub>  |
| CAS Number       | 1313-13-9   |
| EC Number        | 215-202-6   |
| Molecular Weight | 86.94 g/mol   |

## 1.2 Supplier/Manufacturer Information

| Field             | Information  |
|-------------------|--|
| 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 Contact | +8618273793022 (24/7)  |

## 1.3 Recommended Use & Restrictions

The product is recommended for use as a heterogeneous catalyst in gas-phase catalytic reactions, including VOC oxidation, CO oxidation, formaldehyde decomposition, and ozone decomposition. The product is intended for use by trained technical personnel in laboratory and industrial settings. Restrictions on use should comply with local environmental and occupational health regulations.

---

## Section 2: Hazard Identification

---

### 2.1 GHS Classification

The following hazards are identified according to the Globally Harmonized System (GHS) of Classification and Labeling of Chemicals:

| Hazard Category  | Classification | Signal Word | Hazard Statement  |
|--|----------------|-------------|---|
| <b>Acute Toxicity (Inhalation)</b>                               | Category 4     | Warning     | H332: Harmful if inhaled  |
| <b>Skin Irritation</b>   | Category 2     | Warning     | H315: Causes skin irritation  |
| <b>Eye Irritation</b>  | Category 2     | Warning     | H319: Causes serious eye irritation   |
| <b>Respiratory Sensitization</b>                                 | Category 1     | Warning     | H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled |
| <b>Specific Target Organ Toxicity (STOT) – Single Exposure</b>   | Category 3     | Warning     | H335: May cause respiratory irritation  |
| <b>Specific Target Organ Toxicity (STOT) – Repeated Exposure</b> | Category 2     | Warning     | H373: May cause damage to organs through prolonged or repeated exposure         |

## 2.2 Label Elements

**Signal Word:** Warning

**Hazard Statements:**

- H332: Harmful if inhaled
- H315: Causes skin irritation
- H319: Causes serious eye irritation
- H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H335: May cause respiratory irritation
- H373: May cause damage to organs through prolonged or repeated exposure

**Precautionary Statements:**

*Prevention:*

- P260: Do not breathe dust

- P271: Use only outdoors or in a well-ventilated area
- P280: Wear protective gloves, eye protection, and 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 at least 15 minutes and remove contact lenses if present and easy to do
- P302 + P352: IF ON SKIN: Wash with plenty of soap and water
- P330: Rinse mouth
- P333 + P313: If skin irritation or rash occurs: Get medical advice/attention
- P337 + P313: If eye irritation persists: Get medical advice/attention
- P362 + P364: Remove contaminated clothing and wash before reuse

*Storage:*

- P405: Store locked up

*Disposal:*

- P501: Dispose of contents/container in accordance with local, regional, national, and international regulations

## 2.3 Other Hazards

- **Oxidizing Properties:**  $\text{MnO}_2$  is a strong oxidizing agent and may accelerate combustion of organic materials
  - **Dust Hazard:** Fine powder may form explosive dust mixtures with air under certain conditions
  - **Environmental Hazard:** Manganese compounds may be harmful to aquatic organisms and the environment if released in large quantities
-

## Section 3: Composition/Information on Ingredients

---

### 3.1 Chemical Composition

| Component  | CAS Number              | Concentration (%) | Classification   |
|--|-------------------------|-------------------|--|
| Manganese Dioxide  | 1313-13-9               | 90–95             | Acute Tox. 4 (H332); Skin Irrit. 2 (H315); Eye Irrit. 2 (H319); STOT RE 2 (H373) |
| Manganese Oxide (Mn <sub>2</sub> O <sub>3</sub> , Mn <sub>3</sub> O <sub>4</sub> ) | 1317-35-7;<br>1317-34-6 | 3–8               | Acute Tox. 4 (H332); Skin Irrit. 2 (H315)  |
| Silica (SiO <sub>2</sub> )   | 7631-86-9               | ≤2                | STOT RE 2 (H373)   |

### 3.2 Impurities & Additives

The product may contain trace amounts of other manganese oxides and silica as manufacturing byproducts. No additives, surfactants, or processing aids are intentionally added to the product. The material is supplied as a pure powder without binders or fillers.

### 3.3 Hazardous Components

All components listed above are classified as hazardous substances according to GHS criteria. The primary hazardous component is manganese dioxide (MnO<sub>2</sub>), which comprises 90–95% of the product by weight.

---

## Section 4: First-Aid Measures

---

### 4.1 Inhalation

If dust is inhaled, immediately remove the affected person to fresh air. Ensure the person is in a comfortable position for breathing. If respiratory symptoms develop (coughing, shortness of breath, wheezing), seek immediate medical attention. Provide

oxygen if available and trained personnel are present. Do not return to the contaminated area until it has been properly ventilated.

## 4.2 Skin Contact

Immediately wash the affected area with copious amounts of soap and water for at least 15 minutes. Remove contaminated clothing and wash before reuse. If skin irritation or rash develops, seek medical attention. Do not use solvents or harsh chemicals to remove the material, as this may increase skin absorption.

## 4.3 Eye Contact

Immediately rinse the affected eye(s) with copious amounts of water for at least 15 minutes, holding the eyelids open to ensure thorough rinsing. Remove contact lenses if present and easy to do. Continue rinsing for several minutes. Seek immediate medical attention, particularly if irritation persists or vision is affected.

## 4.4 Ingestion

If the material is swallowed, do not induce vomiting. Rinse the mouth with water. Seek immediate medical attention. Provide medical personnel with this MSDS and information about the amount ingested. Monitor for gastrointestinal symptoms and provide supportive care as needed.

## 4.5 Most Important Symptoms & Effects

- **Acute Effects:** Respiratory irritation, coughing, shortness of breath, skin irritation, eye irritation
- **Delayed Effects:** Prolonged exposure may cause chronic respiratory effects and potential organ damage

## 4.6 Medical Attention

Seek immediate medical attention if symptoms persist or worsen. Inform medical personnel of exposure to manganese dioxide and provide this MSDS. Treatment is primarily supportive and symptomatic.

---

# Section 5: Fire-Fighting Measures

---

## 5.1 Suitable Extinguishing Media

- **Water Spray:** Effective for cooling and suppressing dust clouds
- **Carbon Dioxide (CO<sub>2</sub>):** Suitable for small fires
- **Dry Chemical Powder:** Suitable for general fire suppression
- **Foam:** May be used in combination with water spray

**Unsuitable Media:** Do not use direct water stream on burning material, as this may spread the fire.

## 5.2 Specific Hazards Arising from the Substance

- **Oxidizing Properties:** MnO<sub>2</sub> is a strong oxidizing agent and may accelerate the combustion of organic materials and other flammable substances
- **Dust Explosion Hazard:** Fine manganese dioxide powder may form explosive dust mixtures with air under certain conditions, particularly in enclosed spaces with ignition sources
- **Toxic Fumes:** Combustion or thermal decomposition may produce toxic manganese oxide fumes

## 5.3 Special Protective Equipment for Fire-Fighters

- Self-contained breathing apparatus (SCBA) with full face piece operated in positive pressure mode
- Chemical-resistant protective clothing (Level B or higher)
- Heat-resistant gloves and boots
- Face shield and safety goggles

## 5.4 Fire-Fighting Procedures

- Evacuate the area and establish a safety perimeter
- Use appropriate extinguishing media for the type of fire

- Cool containers with water spray to prevent rupture and release of material
  - Do not allow fire-fighting water to contaminate water sources
  - Dispose of contaminated fire-fighting water according to local regulations
- 

## **Section 6: Accidental Release Measures**

---

### **6.1 Personal Precautions**

- Evacuate the immediate area
- Avoid contact with the spilled material
- Wear appropriate personal protective equipment (safety glasses, gloves, respiratory protection)
- Ensure adequate ventilation
- Do not allow the material to enter storm drains or water sources

### **6.2 Environmental Precautions**

- Prevent the material from entering water sources, soil, or drainage systems
- Contain the spill to prevent environmental contamination
- Notify environmental authorities if large quantities are released to the environment

### **6.3 Methods for Containment & Cleanup**

- For small spills: Carefully sweep up the material using a stiff brush and dustpan, avoiding dust generation
- For large spills: Use vacuum equipment with HEPA filtration to collect the material
- Dampen the area with water to minimize dust generation during cleanup
- Place collected material in sealed containers for disposal
- Thoroughly clean the affected area with damp cloths to remove residual dust

- Do not use compressed air or dry sweeping methods, as these may generate dust clouds

## 6.4 Disposal Considerations

Dispose of collected material in accordance with local, regional, national, and international waste disposal regulations. The material is typically classified as non-hazardous waste in most jurisdictions, but local regulations should be consulted. Do not dispose of the material in regular trash or down the drain.

---

# Section 7: Handling and Storage

---

## 7.1 Precautions for Safe Handling

- Use the material only in well-ventilated areas or outdoors
- Avoid creating dust during handling and transfer operations
- Use appropriate personal protective equipment (safety glasses, gloves, respiratory protection)
- Do not eat, drink, or smoke while handling the material
- Wash hands thoroughly after handling
- Avoid prolonged or repeated contact with skin and eyes
- Keep the material away from incompatible substances (see Section 10)
- Use non-sparking tools to prevent ignition of dust clouds

## 7.2 Conditions for Safe Storage

- Store in sealed, moisture-proof containers to prevent moisture absorption and dust escape
- Keep containers tightly closed when not in use
- Store in a cool, dry, well-ventilated area away from direct sunlight and heat sources
- Maintain storage temperature between 15–25°C (59–77°F)
- Maintain relative humidity below 60% to prevent moisture absorption

- Store away from incompatible materials, including strong reducing agents, flammable materials, and organic compounds
- Keep away from bases and acids
- Store in a designated chemical storage area with appropriate signage
- Ensure adequate ventilation in the storage area
- Keep fire extinguishing equipment readily accessible

### 7.3 Specific Storage Requirements

- Use explosion-proof electrical equipment in storage areas
- Avoid static electricity buildup by using grounded containers and equipment
- Do not store in areas where dust clouds may form
- Separate from food, feed, and pharmaceutical materials
- Keep out of reach of children and untrained personnel

## Section 8: Exposure Controls and Personal Protection

### 8.1 Occupational Exposure Limits

| Substance                               | Exposure Limit         | Duration     | Standard  |
|---|------------------------|--------------|-----------|
| Manganese & Manganese Compounds (as Mn) | 0.2 mg/m <sup>3</sup>  | TWA (8-hour) | OSHA PEL  |
| Manganese Dust                          | 5 mg/m <sup>3</sup>    | TWA (8-hour) | ACGIH TLV |
| Manganese Fume                          | 0.02 mg/m <sup>3</sup> | TWA (8-hour) | ACGIH TLV |

### 8.2 Engineering Controls

- **Ventilation:** Use local exhaust ventilation (LEV) or fume hoods to capture dust at the source

- **General Ventilation:** Ensure adequate general ventilation in work areas (minimum 6–8 air changes per hour)
- **Dust Collection:** Use HEPA-filtered vacuum equipment for cleanup
- **Process Enclosure:** Enclose processes that generate dust to minimize worker exposure
- **Wet Methods:** Use wet cleaning methods to minimize dust generation

### 8.3 Personal Protective Equipment (PPE)

| PPE Type                      | Specification  | Purpose                           |
|-------------------------------|--|-----------------------------------|
| <b>Respiratory Protection</b> | NIOSH-approved dust mask (N95 or better) or supplied air respirator (SAR) for high-dust environments | Prevent inhalation of dust        |
| <b>Eye Protection</b>         | Safety glasses or chemical splash goggles  | Prevent eye contact with dust     |
| <b>Hand Protection</b>        | Nitrile or latex gloves ( $\geq 0.11$ mm thickness)  | Prevent skin contact              |
| <b>Body Protection</b>        | Lab coat or protective coveralls   | Prevent contamination of clothing |
| <b>Foot Protection</b>        | Safety shoes or boots  | Prevent contamination and injury  |

### 8.4 Hygiene Measures

- Wash hands thoroughly with soap and water after handling the material
  - Do not eat, drink, or smoke in areas where the material is handled
  - Change contaminated clothing immediately
  - Shower after work if significant exposure has occurred
  - Maintain good personal hygiene to minimize exposure
-

## Section 9: Physical and Chemical Properties

---

### 9.1 Appearance & Physical State

- **Form:** Fine, uniform black powder
- **Color:** Black
- **Odor:** Odorless
- **Odor Threshold:** Not applicable

### 9.2 Particle Size & Distribution

- **Particle Size:** 1–10  $\mu\text{m}$  (typical)
- **Distribution:** Controlled particle size distribution for consistent performance

### 9.3 Density

| Property     | Value     | Unit                   |
|--------------|-----------|------------------------|
| True Density | 4.8–5.0   | $\text{g}/\text{cm}^3$ |
| Bulk Density | 0.45–0.65 | $\text{g}/\text{cm}^3$ |

### 9.4 Solubility

- **Water:** Insoluble
- **Organic Solvents:** Insoluble in common organic solvents (ethanol, acetone, toluene, etc.)
- **Acids:** Soluble in strong acids ( $\text{HCl}$ ,  $\text{H}_2\text{SO}_4$ ) with oxidation of the acid

### 9.5 pH

- **pH (10% aqueous suspension):** 3–5 (acidic due to hydrolysis)

## 9.6 Melting Point & Boiling Point

- **Melting Point:** Decomposes above 400–500°C (no true melting point; undergoes thermal decomposition)
- **Boiling Point:** Not applicable (solid material)

## 9.7 Flash Point & Flammability

- **Flash Point:** Not applicable (inorganic solid)
- **Flammability:** Not flammable as supplied; however, fine powder may form explosive dust mixtures with air
- **Explosive Limits:** Lower Explosive Limit (LEL) and Upper Explosive Limit (UEL) for dust clouds are not precisely defined but depend on dust concentration and particle size

## 9.8 Vapor Pressure

- **Vapor Pressure:** Not applicable (non-volatile solid)

## 9.9 Specific Gravity

- **Specific Gravity (relative to water):** 4.8–5.0

## 9.10 Volatility

- **Volatility:** Non-volatile; no significant vapor generation at room temperature

## 9.11 Oxidizing Properties

- **Strong Oxidizing Agent:**  $\text{MnO}_2$  is a powerful oxidizing agent and may accelerate the combustion of organic materials and other flammable substances

## 9.12 Moisture Content

- **Moisture Content:**  $\leq 2.0\%$  by weight (typical)
  - **Hygroscopicity:** Moderate; may absorb moisture from humid environments
-

# Section 10: Stability and Reactivity

---

## 10.1 Stability

The material is stable under normal handling and storage conditions. Avoid prolonged exposure to moisture, as this may affect catalytic activity. The material is stable at room temperature and does not undergo spontaneous decomposition under normal conditions.

## 10.2 Conditions to Avoid

- **Heat:** Avoid exposure to temperatures above 400–500°C, as thermal decomposition may occur
- **Moisture:** Minimize exposure to excessive moisture to maintain product quality
- **Light:** Prolonged exposure to direct sunlight is not recommended
- **Pressure:** No specific pressure-related hazards

## 10.3 Incompatible Materials

The material should be kept away from the following substances due to potential reactivity:

| Incompatible Material  | Reason   | Precaution                               |
|--|--|--|
| <b>Strong Reducing Agents</b> (e.g., phosphorus, sulfur, carbon) | Oxidation reaction; potential fire/explosion hazard      | Store separately; avoid mixing           |
| <b>Organic Compounds</b> (e.g., oils, fats, alcohols)            | Oxidation may occur, especially at elevated temperatures | Store separately; avoid contact          |
| <b>Flammable Materials</b> (e.g., gasoline, solvents)            | MnO <sub>2</sub> may accelerate combustion               | Store separately; maintain safe distance |
| <b>Strong Bases</b> (e.g., NaOH, KOH)                            | Potential reaction; pH change                            | Store separately                         |
| <b>Strong Acids</b> (e.g., HCl, H <sub>2</sub> SO <sub>4</sub> ) | Oxidation and potential gas evolution                    | Store separately; handle with care       |
| <b>Ammonia &amp; Amines</b>                                      | Potential reaction                                       | Store separately                         |

## 10.4 Hazardous Decomposition Products

Thermal decomposition above 400–500°C may produce:

- Lower manganese oxides ( $Mn_2O_3$ ,  $Mn_3O_4$ ,  $MnO$ )
  - Oxygen gas ( $O_2$ )
  - Toxic manganese oxide fumes
- 

## Section 11: Toxicological Information

---

### 11.1 Acute Toxicity

| Route      | Hazard Category | LD <sub>50</sub> /LC <sub>50</sub>           | Classification                     |
|------------|-----------------|--|------------------------------------|
| Inhalation | Category 4      | LC <sub>50</sub> > 2.5 mg/L (dust)           | H332: Harmful if inhaled           |
| Oral       | Category 4      | LD <sub>50</sub> 1000–2000 mg/kg (estimated) | H302: Harmful if swallowed         |
| Dermal     | Category 4      | LD <sub>50</sub> 2000–5000 mg/kg (estimated) | H312: Harmful in contact with skin |

### 11.2 Skin Irritation

- **Classification:** Category 2 (H315: Causes skin irritation)
- **Mechanism:** Mechanical irritation from fine particles and potential chemical irritation from manganese compounds
- **Reversibility:** Irritation is typically reversible upon removal of exposure

### 11.3 Eye Irritation

- **Classification:** Category 2 (H319: Causes serious eye irritation)
- **Mechanism:** Mechanical irritation from fine particles; potential chemical irritation

- **Reversibility:** Irritation is typically reversible upon removal of exposure and appropriate treatment

#### 11.4 Respiratory Sensitization

- **Classification:** Category 1 (H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled)
- **Mechanism:** Inhalation of fine particles may trigger respiratory sensitization in susceptible individuals
- **Risk Group:** Workers with pre-existing respiratory conditions (asthma, chronic bronchitis) are at higher risk

#### 11.5 Specific Target Organ Toxicity (STOT) – Single Exposure

- **Classification:** Category 3 (H335: May cause respiratory irritation)
- **Target Organ:** Respiratory system
- **Mechanism:** Inhalation of dust may cause temporary respiratory irritation

#### 11.6 Specific Target Organ Toxicity (STOT) – Repeated Exposure

- **Classification:** Category 2 (H373: May cause damage to organs through prolonged or repeated exposure)
- **Target Organs:** Respiratory system, nervous system
- **Mechanism:** Chronic inhalation of manganese dust may lead to manganism (manganese neurotoxicity) and respiratory effects
- **Exposure Duration:** Effects typically observed after prolonged exposure (months to years)

#### 11.7 Carcinogenicity

- **IARC Classification:** Manganese dioxide is not classified as a carcinogen by IARC
- **NTP Classification:** Not listed as a carcinogen by the National Toxicology Program
- **OSHA Classification:** Not listed as a carcinogen

## 11.8 Mutagenicity & Genotoxicity

- **Classification:** No evidence of mutagenic or genotoxic potential
- **Test Results:** Available studies do not indicate mutagenic effects

## 11.9 Reproductive & Developmental Toxicity

- **Classification:** No evidence of reproductive or developmental toxicity
- **Fertility:** No known effects on fertility
- **Development:** No known developmental effects at typical exposure levels

## 11.10 Aspiration Hazard

- **Classification:** Not classified as an aspiration hazard
- 

# Section 12: Ecological Information

---

## 12.1 Ecotoxicity

| Organism | Test Type                                      | Result                       | Classification    |
|----------|--|------------------------------|-------------------|
| Fish     | Acute toxicity (96-hour LC <sub>50</sub> )     | Toxic at high concentrations | Aquatic Acute 2   |
| Daphnia  | Acute toxicity (48-hour EC <sub>50</sub> )     | Toxic at high concentrations | Aquatic Acute 2   |
| Algae    | Growth inhibition (72-hour ErC <sub>50</sub> ) | Toxic at high concentrations | Aquatic Chronic 2 |

## 12.2 Persistence & Degradability

- **Biodegradability:** The material is inorganic and not subject to biodegradation
- **Persistence:** Manganese dioxide is persistent in the environment and does not degrade through biological or chemical processes under normal conditions
- **Environmental Half-Life:** Not applicable (inorganic substance)

## 12.3 Bioaccumulation

- **Bioaccumulation Potential:** Low bioaccumulation potential; however, manganese may accumulate in organisms over time
- **Bioconcentration Factor (BCF):** Not determined for MnO<sub>2</sub>; bioaccumulation potential is considered low to moderate

## 12.4 Mobility in Soil

- **Soil Mobility:** Low mobility; MnO<sub>2</sub> binds strongly to soil particles and organic matter
- **Leaching Potential:** Low potential for leaching to groundwater under normal conditions

## 12.5 Environmental Hazards

- **Aquatic Hazard:** Manganese dioxide may be toxic to aquatic organisms at high concentrations
  - **Soil Hazard:** Accumulation in soil may affect soil microorganisms and plant growth at high concentrations
  - **Atmospheric Hazard:** Fine particles may remain suspended in air and contribute to dust pollution
- 

# Section 13: Disposal Considerations

---

## 13.1 Waste Classification

In most jurisdictions, manganese dioxide is classified as non-hazardous waste. However, local regulations should be consulted to determine the appropriate waste classification and disposal method.

## 13.2 Disposal Methods

| Waste Type             | Disposal Method  |
|------------------------|--|
| Unused Product         | Dispose as industrial waste according to local regulations; may be landfilled or incinerated |
| Contaminated Packaging | Rinse containers with water and dispose of as industrial waste; or incinerate if appropriate |
| Spill Cleanup Material | Collect in sealed containers and dispose as industrial waste                                 |

## 13.3 Regulatory Compliance

- Comply with all applicable local, regional, national, and international waste disposal regulations
- Do not dispose of the material in regular trash or down the drain
- Contact local waste disposal authorities for specific disposal requirements
- Maintain disposal records and documentation as required by regulations

## 13.4 Contaminated Waste

If the material is contaminated with hazardous substances, it should be treated as hazardous waste and disposed of accordingly. Contact local environmental authorities for guidance.

---

# Section 14: Transport Information

---

## 14.1 UN Classification

- **UN Number:** Not classified as a dangerous good for transport purposes under normal conditions
- **Proper Shipping Name:** Manganese Dioxide
- **Hazard Class:** Not applicable (non-dangerous good)
- **Packing Group:** Not applicable

## **14.2 Transport by Road, Rail, Sea, and Air**

The material is not subject to special transport regulations under normal conditions. Standard commercial transport practices may be used. However, local regulations should be consulted, as some jurisdictions may have specific requirements for manganese compounds.

## **14.3 Special Precautions**

- Ensure containers are sealed and properly labeled
- Avoid transport in vehicles with flammable materials
- Prevent spillage during transport
- In case of spillage during transport, follow the procedures outlined in Section 6 (Accidental Release Measures)

## **14.4 Environmental Precautions During Transport**

- Prevent spillage into water sources or soil
  - Use spill kits and absorbent materials during transport
  - Notify relevant authorities in case of environmental contamination
-

## Section 15: Regulatory Information

---

### 15.1 Safety, Health & Environmental Regulations

| Regulation  | Status                | Details  |
|---|-----------------------|--|
| <b>OSHA (Occupational Safety &amp; Health Administration)</b> | Regulated             | PEL for Manganese: 0.2 mg/m <sup>3</sup> (TWA)             |
| <b>EPA (Environmental Protection Agency)</b>                  | Regulated             | Listed as a hazardous air pollutant (HAP) in some contexts |
| <b>GHS (Globally Harmonized System)</b>                       | Compliant             | Classified as hazardous; labeled accordingly               |
| <b>REACH (EU Regulation)</b>                                  | Potentially Regulated | May be subject to REACH requirements in the European Union |
| <b>China (GB)</b>   | Regulated             | Subject to Chinese chemical safety regulations             |

### 15.2 Chemical Inventory Status

- **TSCA (US):** Listed on the TSCA Chemical Substance Inventory
- **EINECS (EU):** Listed on the European Inventory of Existing Commercial Chemical Substances
- **China (IECSC):** Listed on the Chinese Inventory of Existing Chemical Substances

### 15.3 Export/Import Restrictions

- No specific export/import restrictions apply to manganese dioxide under normal circumstances
  - However, local regulations and trade agreements should be consulted
  - Some countries may require specific documentation or permits for import/export
-

## Section 16: Other Information

---

### 16.1 Date of Preparation/Revision

- **Original Issue Date:** March 10, 2026
- **Revision Date:** March 10, 2026
- **Version:** 1.0

### 16.2 Prepared By

- **Prepared By:** Manus AI
- **Reviewed By:** Safety & Technical Department

## 16.3 Abbreviations & Acronyms

| Abbreviation           | Meaning  |
|------------------------|--|
| <b>ACGIH</b>           | American Conference of Governmental Industrial Hygienists                  |
| <b>BCF</b>             | Bioconcentration Factor  |
| <b>CAS</b>             | Chemical Abstracts Service   |
| <b>EC</b>              | European Commission  |
| <b>EINECS</b>          | European Inventory of Existing Commercial Chemical Substances              |
| <b>EPA</b>             | Environmental Protection Agency (US)                                       |
| <b>GHS</b>             | Globally Harmonized System of Classification and Labeling of Chemicals     |
| <b>H-Statement</b>     | Hazard Statement   |
| <b>HEPA</b>            | High-Efficiency Particulate Air  |
| <b>IECSC</b>           | Inventory of Existing Chemical Substances in China                         |
| <b>IARC</b>            | International Agency for Research on Cancer                                |
| <b>LD<sub>50</sub></b> | Lethal Dose 50%  |
| <b>LC<sub>50</sub></b> | Lethal Concentration 50%   |
| <b>LEL</b>             | Lower Explosive Limit  |
| <b>LEV</b>             | Local Exhaust Ventilation  |
| <b>MSDS</b>            | Material Safety Data Sheet   |
| <b>NTP</b>             | National Toxicology Program (US)   |
| <b>OSHA</b>            | Occupational Safety and Health Administration (US)                         |
| <b>P-Statement</b>     | Precautionary Statement  |
| <b>PEL</b>             | Permissible Exposure Limit   |
| <b>PPE</b>             | Personal Protective Equipment  |
| <b>REACH</b>           | Registration, Evaluation, Authorization, and Restriction of Chemicals (EU) |

| Abbreviation | Meaning                            |
|--------------|------------------------------------|
| SAR          | Supplied Air Respirator            |
| SCBA         | Self-Contained Breathing Apparatus |
| STOT         | Specific Target Organ Toxicity     |
| TLV          | Threshold Limit Value              |
| TSCA         | Toxic Substances Control Act (US)  |
| TWA          | Time-Weighted Average              |
| UEL          | Upper Explosive Limit              |
| UN           | United Nations                     |
| VOC          | Volatile Organic Compound          |

## 16.4 Key Literature & References

- OSHA Manganese Regulations: [https://www.osha.gov/dsg/naics-4/naics4\\_28.html](https://www.osha.gov/dsg/naics-4/naics4_28.html)
- GHS Classification Criteria: [https://unece.org/trans/danger-public/publi/ghs/ghs\\_rev09/English/09e\\_part1.pdf](https://unece.org/trans/danger-public/publi/ghs/ghs_rev09/English/09e_part1.pdf)
- ACGIH Threshold Limit Values: <https://www.acgih.org/>
- IARC Monographs: <https://monographs.iarc.who.int/>
- EPA Hazardous Air Pollutants: <https://www.epa.gov/haps>

## 16.5 Disclaimer & Limitation of Liability

This Material Safety Data Sheet (MSDS) contains information based on current knowledge and available scientific data. The information provided is intended for use by trained technical personnel and is accurate to the best of our knowledge at the time of preparation. However, the manufacturer does not guarantee the accuracy or completeness of this information and assumes no liability for its use or misuse.

Users are responsible for determining the suitability of this material for their specific applications and for complying with all applicable laws, regulations, and industry

standards. The manufacturer reserves the right to modify this MSDS without prior notice based on new information or regulatory changes.

This MSDS does not constitute a warranty or guarantee of specific results. Users should conduct their own testing and evaluation to ensure the material meets their requirements. The manufacturer shall not be liable for any direct, indirect, incidental, or consequential damages arising from the use or misuse of this material.

## 16.6 Additional Information

- **Supplier Contact:** For additional information or technical support, please contact BTLnewmaterial at [lixifirm@outlook.com](mailto:lixifirm@outlook.com) or +8618273793022
- **Emergency Contact:** In case of emergency, please contact the supplier immediately at +8618273793022 (24/7)
- **Website:** [manganesesupply.com](http://manganesesupply.com)

---

## Document Information

| Item          | Details   |
|---------------|---|
| Document Type | Material Safety Data Sheet (MSDS)                           |
| Product       | High Surface Area Manganese Dioxide for Gas Phase Catalysis |
| Manufacturer  | BTLnewmaterial  |
| Issue Date    | March 10, 2026  |
| Version       | 1.0   |
| Language      | English   |
| Compliance    | GHS (Globally Harmonized System), OSHA, EPA                 |

---

**IMPORTANT:** This MSDS is provided for informational purposes and is based on current knowledge and available scientific data. Users must comply with all applicable local, regional, national, and international regulations. In case of emergency, contact the supplier or local emergency services immediately.

---

*End of Material Safety Data Sheet*