Safety Data Sheet (SDS): Manganese Dioxide for Aerospace Sealant Formulations

1. Identification

Product Identifier

- **Product Name**: Manganese Dioxide for Aerospace Sealant Formulations
- **Chemical Name**: Manganese Dioxide (Manganese(IV) oxide)
- **CAS Number**: 1313-13-9
- **Synonyms**: Pyrolusite, Manganese Black, Battery Manganese

Recommended Use of the Chemical and Restrictions on Use

- **Recommended Use**: Curing agent in polysulfide sealants for aircraft structures and fuel systems.
- **Restrictions on Use**: For industrial use only. Not for food, drug, or household use.

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

- +8618273793022 (General)

2. Hazard(s) Identification

GHS Classification in accordance with OSHA Hazard Communication Standard (29 CFR 1910.1200)

- **Acute toxicity (oral)**: Category 4 [1]
- **Acute toxicity (inhalation)**: Category 4 [1]
- **Oxidizing solids**: Category 2 [8]
- **Specific target organ toxicity - repeated exposure (inhalation)**: Category 2 (Central nervous system, Respiratory system) [11]

GHS Label Elements

- **Hazard Pictograms**:
  - GHS03 (Flame over circle - Oxidizer)
  - GHS07 (Exclamation mark - Harmful)
  - GHS08 (Health hazard - Specific target organ toxicity)
- **Signal Word**: Danger [8]
- **Hazard Statements**:

- H302: Harmful if swallowed [1]
- H332: Harmful if inhaled [1]
- H272: May intensify fire; oxidizer [8]
- H373: May cause damage to organs (Central nervous system, Respiratory system) through prolonged or repeated exposure if inhaled [11]

- **Precautionary Statements**:
  - **Prevention**:
    - P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
    - P220: Keep away from clothing and other combustible materials.
    - P260: Do not breathe dust/fume/gas/mist/vapors/spray.
    - P264: Wash skin thoroughly after handling.
    - P270: Do not eat, drink or smoke when using this product.
    - P271: Use only outdoors or in a well-ventilated area.
    - P280: Wear protective gloves/protective clothing/eye protection/face protection.
  - **Response**:
    - P301 + P312 + P330: IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
    - P304 + P340 + P312: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
    - P370 + P378: In case of fire: Use water spray, foam, dry chemical, or carbon dioxide to extinguish.
    - P314: Get medical advice/attention if you feel unwell.
  - **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.

Other Hazards

- Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

3. Composition/Information on Ingredients

Substance

- **Chemical Name**: Manganese Dioxide
- **Common Name**: Manganese(IV) oxide
- **CAS Number**: 1313-13-9
- **Concentration**: 90-98% (as MnO_2 Purity from product specifications)

4. First-Aid Measures

Description of Necessary First-Aid Measures

- **General Advice**: Consult a physician. Show this safety data sheet to the doctor in attendance.
- **If Inhaled**: 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**: Rinse mouth with water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Consult a physician.

Most Important Symptoms/Effects, Both Acute and Delayed

- **Acute**: Irritation to eyes, skin, and respiratory tract. Harmful if swallowed or inhaled.
- **Delayed**: Prolonged or repeated inhalation of manganese dust may cause manganism, a neurological disorder resembling Parkinson's disease, and damage to the respiratory system [11, 12].

Indication of Immediate Medical Attention and Special Treatment Needed, If Necessary

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

5. Fire-Fighting Measures

Suitable Extinguishing Media

- Use water spray, foam, dry chemical, or carbon dioxide (CO_2) [10].

Specific Hazards Arising from the Chemical

- Non-combustible, but acts as an oxidizer and may intensify fire of combustible materials [8].
- When heated to decomposition, may emit toxic fumes of manganese oxides [8].

Special Protective Equipment and Precautions for Firefighters

- Wear self-contained breathing apparatus (SCBA) for firefighting if necessary.
- Wear full protective clothing.
- Fight fire from a safe distance.
- Cool containers with water spray.

6. Accidental Release Measures

Personal Precautions, Protective Equipment, and Emergency Procedures

- Use personal protective equipment (PPE) as required (see Section 8).
- Avoid dust formation. Avoid breathing dust.
- Ensure adequate ventilation.
- Evacuate personnel to safe areas.

Environmental Precautions

- Do not let product enter drains. Do not allow to enter into soil/subsoil. Do not contaminate surface water or groundwater.

Methods and Materials for Containment and Cleaning Up

- **Small Spills**: Pick up and arrange disposal without creating dust. Sweep up and shovel. Keep in suitable, closed containers for disposal.
- **Large Spills**: Contain spillage, then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see Section 13).

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.
- Keep away from sources of ignition - No smoking.
- Keep away from combustible material.
- For precautions see section 2.2.

Conditions for Safe Storage, Including Any Incompatibilities

- Store in a cool, dry, and well-ventilated place.
- Keep container tightly closed.
- Store away from incompatible materials (e.g., strong reducing agents, combustible materials, acids).
- Keep away from moisture [9].

8. Exposure Controls/Personal Protection

Control Parameters

- **OSHA Permissible Exposure Limit (PEL)**: 5 mg/m^3 (Ceiling, as Mn) [13]
- **ACGIH Threshold Limit Value (TLV)**: 0.02 mg/m^3 (Respirable fraction, as Mn); 0.1 mg/m^3 (Inhalable fraction, as Mn) [13]
- **NIOSH Recommended Exposure Limit (REL)**: 1 mg/m^3 (TWA, as Mn); 3 mg/m^3 (STEL, as Mn) [13]

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 or other engineering controls to keep airborne levels below recommended 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.
- **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.
- **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).

9. Physical and Chemical Properties

Appearance

- **Physical State**: Solid
- **Form**: Powder
- **Color**: Black

Odor: Odorless **Odor Threshold**: Not applicable **pH**: Not available (typically insoluble in water, pH of slurry can vary) **Melting Point/Freezing Point**: ~535 °C (decomposes) [14] **Initial Boiling Point and Boiling Range**: Not applicable (decomposes before boiling) **Flash Point**: Not applicable (inorganic solid) **Evaporation Rate**: Not applicable **Flammability (solid, gas)**: Non-flammable, but oxidizing [8] **Upper/Lower Flammability or Explosive Limits**: Not applicable **Vapor Pressure**: Not applicable **Vapor Density**: Not applicable **Relative Density (Bulk Density)**: 0.6–1.0 g/cm^3 (from product specifications) **Solubility(ies)**: Insoluble in water. Soluble in hydrochloric acid with evolution of chlorine; soluble in sulfuric acid with evolution of oxygen;

soluble in oxalic acid [14]. **Partition Coefficient n-octanol/water**: Not applicable (inorganic substance) **Auto-Ignition Temperature**: Not applicable **Decomposition Temperature**: >535 °C [14] **Viscosity**: Not applicable (solid)

10. Stability and Reactivity

Reactivity

- Oxidizing agent. Reacts with reducing agents.

Chemical Stability

- Stable under recommended storage conditions.

Possibility of Hazardous Reactions

- Reacts violently with strong reducing agents, acids, and combustible materials.

Conditions to Avoid

- Heat, flames, sparks, incompatible materials, moisture.

Incompatible Materials

- Strong reducing agents, strong acids, combustible materials, peroxides, easily oxidizable materials.

Hazardous Decomposition Products

- Manganese oxides (when heated to decomposition) [8].

11. Toxicological Information

Information on Toxicological Effects

- **Acute Toxicity**:
  - **Oral (LD50)**: >3478 mg/kg (Rat) [15] - Harmful if swallowed.
  - **Inhalation (LC50)**: >1.5 mg/L (Rat, 4h) [15] - Harmful if inhaled.
  - **Dermal (LD50)**: Not available.
- **Skin Corrosion/Irritation**: May cause mild skin irritation [8].
- **Serious Eye Damage/Irritation**: May cause eye irritation.
- **Respiratory or Skin Sensitization**: Not classified as a respiratory or skin sensitizer.
- **Germ Cell Mutagenicity**: Not classified as mutagenic.
- **Carcinogenicity**: Not classified as carcinogenic by IARC, NTP, or OSHA.
- **Reproductive Toxicity**: Not classified as a reproductive toxicant.
- **STOT-Single Exposure**: Not classified.
- **STOT-Repeated Exposure**: Prolonged or repeated inhalation of manganese dust may cause damage to the central nervous system and respiratory system (manganism) [11, 12].
- **Aspiration Hazard**: Not an aspiration hazard.

12. Ecological Information

Ecotoxicity

- **Fish (LC50)**: Not readily available for MnO_2 specifically, but manganese compounds can be toxic to aquatic organisms at high concentrations.
- **Daphnia (EC50)**: Not readily available.

- **Algae (EC50)**: Not readily available.

Persistence and Degradability

- Manganese dioxide is an inorganic compound and is not expected to be biodegradable [7]. It is persistent in the environment.

Bioaccumulative Potential

- Manganese can bioaccumulate in some organisms, but MnO_2 itself has low solubility, limiting its bioaccumulation potential.

Mobility in Soil

- Low mobility in soil due to low solubility.

Other Adverse Effects

- No other adverse environmental effects are expected from this product.

13. Disposal Considerations

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. Dispose of contents/container in accordance with local/regional/national/international regulations.
- **Contaminated Packaging**: Dispose of as unused product.

14. Transport Information

DOT (US), IMDG, IATA

- **UN Number**: UN 3137 [16]
- **UN Proper Shipping Name**: OXIDIZING SOLID, WATER-REACTIVE, N.O.S. (Manganese Dioxide) [16]
- **Transport Hazard Class(es)**:
  - **Primary Hazard**: 5.1 (Oxidizer) [16]
  - **Subsidiary Hazard**: 4.3 (Dangerous when wet) [16]
- **Packing Group**: II [16]
- **Environmental Hazards**: Not classified as an environmental hazard for transport.
- **Special Precautions for User**: Refer to Section 7 and 8.

15. Regulatory Information

Safety, Health, and Environmental Regulations Specific for the Product

- **US Federal Regulations**:
  - **TSCA (Toxic Substances Control Act)**: All ingredients are listed or exempt [2].
  - **CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)**: Not applicable.
  - **SARA 302 (Extremely Hazardous Substances)**: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
  - **SARA 313 (Toxic Chemical Release Inventory)**: The following components are subject to reporting levels established by SARA Title III, Section 313: Manganese compounds (CAS 1313-13-9).
  - **OSHA (Occupational Safety and Health Administration)**: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

- **State Regulations**: Consult local and state regulations for specific requirements.
- **International Regulations**: Consult national and international regulations for specific requirements.

16. Other Information

Date of Preparation of SDS: March 12, 2026 **Date of Last Revision**: N/A

Key/Legend to Abbreviations and Acronyms Used in the SDS:

- **ACGIH**: American Conference of Governmental Industrial Hygienists
- **CAS**: Chemical Abstracts Service
- **CERCLA**: Comprehensive Environmental Response, Compensation, and Liability Act
- **DOT**: Department of Transportation
- **GHS**: Globally Harmonized System of Classification and Labelling of Chemicals
- **IARC**: International Agency for Research on Cancer
- **IATA**: International Air Transport Association
- **IMDG**: International Maritime Dangerous Goods
- **LC50**: Lethal Concentration 50%
- **LD50**: Lethal Dose 50%
- **MnO_2**: Manganese Dioxide
- **MSDS**: Material Safety Data Sheet
- **NIOSH**: National Institute for Occupational Safety and Health
- **N.O.S.**: Not Otherwise Specified
- **NTP**: National Toxicology Program
- **OSHA**: Occupational Safety and Health Administration
- **PEL**: Permissible Exposure Limit
- **PPE**: Personal Protective Equipment
- **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
- **TWA**: Time-Weighted Average
- **TSCA**: Toxic Substances Control Act
- **UN**: United Nations

References: [1] Aquaphoenix Scientific. (2018, January 30). *Manganese dioxide (MD1200) - Safety Data Sheet*. Retrieved from https://sds.aquaphoenixsci.com/SDS/186378_MD1200_GHSUnitedStatesSDS_en_2018-01-30.pdf [2] Fisher Scientific. *Safety Data Sheet - Manganese Dioxide PWD*. Retrieved from https://www.fishersci.com/store/msds?partNumber=S25420A&productDescription=MANGANESE+DIOXIDE+PWD+500G+LG&vendorId=VN00115888&countryCode=US&lan [7] Sigma-Aldrich. (2025, November 6). *SAFETY DATA SHEET - Manganese(IV) oxide*. Retrieved from https://www.sigmaaldrich.com/US/en/sds/aldrich/529664?srsltid=AfmBOorhWrXfC_iIiQclCYWUcP1CGqmVT5BnPslDOzcxAztzC1P8XDYX [8] Materion. (2015, May 26). *SDS US - Manganese Oxide (MnO2)*. Retrieved from https://www.materion.com/en/resources/environmental-health-safety/safety-data-sheets/DownloadSds?sdsId=1WS_MANGANESE%20OXIDE%20(MNO2)_SDS-US_English.pdf [9] UIC Inc. *Safety Data Sheet Manganese Dioxide*. Retrieved from https://www.uicinc.com/wp-content/uploads/2019/11/CM300-009-Manganese-Dioxide-SDS-V1.0.pdf [10] Illinois FAA. *MANGANESE DIOXIDE Material Safety Data Sheet*. Retrieved from https://web.faa.illinois.edu/app/uploads/sites/6/2021/05/Maganese-Dioxide.pdf [11] NCBI. (2012). *HEALTH EFFECTS - Toxicological Profile for Manganese*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK158868/ [12] ATSDR. *Toxicological*

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