

Safety Data Sheet: Reagent Grade Manganese Dioxide (MnO₂)

Section 1: Identification

Product Identifier: Reagent Grade Manganese Dioxide (MnO₂)

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

Recommended use of the chemical and restrictions on use:

- Laboratory research
- Analytical applications
- Chemical synthesis
- Catalyst studies and oxidative reaction research
- Electrochemical and battery material investigations
- Materials science research involving transition metal oxides

Supplier details:

- **Company Name:** BTLnewmaterial
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Emergency phone number: +8618273793022

Section 2: Hazard(s) Identification

GHS Classification:

- **Acute toxicity, Oral (Category 4)** - H302: Harmful if swallowed.
- **Specific target organ toxicity - repeated exposure (Category 2)** - H373: May cause damage to organs (lungs) through prolonged or repeated exposure if inhaled.

GHS Label elements, including precautionary statements:

Pictogram:

 GHS07 - Exclamation Mark

 GHS08 - Health Hazard

Signal word: Warning

Hazard statements:

- H302: Harmful if swallowed.
- H373: May cause damage to organs (lungs) through prolonged or repeated exposure if inhaled.

Precautionary statements:

- **Prevention:**
 - P260: Do not breathe dust/fume/gas/mist/vapours/spray.
 - P264: Wash thoroughly after handling.
 - P270: Do not eat, drink or smoke when using this product.
- **Response:**
 - P301 + P312 + P330: IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
 - P314: Get medical advice/attention if you feel unwell.
- **Disposal:**
 - P501: Dispose of contents/container to an approved waste disposal plant.

Section 3: Composition/Information on Ingredients

Substance: Manganese Dioxide

Chemical Name	Common Name	CAS No.	EC No.	Concentration (Purity)
Manganese Dioxide	Manganese(IV) oxide	1313-13-9	215-202-6	≥99.5%

Assay (Mn content): 63.0–64.5%

Section 4: 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.

In case of eye contact: Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed: Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Most important symptoms and effects, both acute and delayed: The most important known symptoms and effects are described in the labelling (Section 2) and/or in Section 11.

Indication of any immediate medical attention and special treatment needed: No data available.

Section 5: Fire-Fighting Measures

Suitable extinguishing media: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific hazards arising from the chemical: Not combustible. Product is an oxidizing agent, but not readily combustible. It may enhance combustion of other combustible materials.

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

Further information: No data available.

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Avoid breathing dust. For personal protection see section 8.

Environmental precautions: Do not let product enter drains.

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. For disposal see section 13.

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. For precautions see section 2.

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

Section 8: Exposure Controls/Personal Protection

Control parameters:

Occupational Exposure Limits:

Component	CAS No.	Value	Control parameters	Basis
Manganese Dioxide	1313-13-9	TWA	0.02 mg/m ³ (respirable fraction)	ACGIH TLV (Threshold Limit Values)
		TWA	0.1 mg/m ³ (inhalable fraction)	ACGIH TLV (Threshold Limit Values)
		PEL	5 mg/m ³ (ceiling)	OSHA PEL (Permissible Exposure Limits)

Exposure controls:

Appropriate engineering controls: Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment:

- **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. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. 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:** Complete suit protecting against chemicals. 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

Information on basic physical and chemical properties:

Property	Value
Appearance	Fine brown to black powder
Odor	Odorless
Odor Threshold	Not applicable
pH (1% aqueous)	6.5–8.5
Melting point/freezing point	~535 °C (decomposes)
Initial boiling point and boiling range	Not applicable
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 (at 25 °C)
Water solubility	Insoluble
Partition coefficient: n-octanol/water	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	>535 °C
Viscosity	Not applicable (solid)
Explosive properties	Not explosive
Oxidizing properties	Oxidizing agent
Particle Size D50	5–20 µm (typical)
Moisture (KF)	≤0.5%
Insoluble Matter	≤0.1%

Property	Value
Heavy Metals (as Pb)	≤10 ppm
Chloride (Cl ⁻)	≤50 ppm
Sulfate (SO ₄ ²⁻)	≤50 ppm

Section 10: Stability and Reactivity

Reactivity: Oxidizing agent. Reacts with strong reducing agents.

Chemical stability: Stable under recommended storage conditions.

Possibility of hazardous reactions: No data available.

Conditions to avoid: Incompatible materials.

Incompatible materials: Strong reducing agents, strong acids, combustible materials.

Hazardous decomposition products: Manganese oxides. Other decomposition products - No data available. In the event of fire: see section 5.

Section 11: Toxicological Information

Information on toxicological effects:

Acute toxicity:

- **Oral LD50:** LD50 Oral - Rat - 9,000 mg/kg (Manganese dioxide) [1]
- **Inhalation LC50:** No data available
- **Dermal LD50:** No data available

Skin corrosion/irritation: No data available.

Serious eye damage/eye irritation: No data available.

Respiratory or skin sensitisation: No data available.

Germ cell mutagenicity: No data available.

Carcinogenicity:

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity: No data available.

Specific target organ toxicity - single exposure: No data available.

Specific target organ toxicity - repeated exposure: May cause damage to organs (lungs) through prolonged or repeated exposure if inhaled.

Aspiration hazard: No data available.

Additional Information:

- RTECS: OO0350000
- To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Section 12: Ecological Information

Toxicity:

- **Toxicity to fish:** LC50 - *Oncorhynchus mykiss* (rainbow trout) - 2.7 mg/l - 96 h (Manganese dioxide) [2]
- **Toxicity to daphnia and other aquatic invertebrates:** EC50 - *Daphnia magna* (Water flea) - 1.2 mg/l - 48 h (Manganese dioxide) [2]

Persistence and degradability: No data available.

Bioaccumulative potential: No data available.

Mobility in soil: No data available.

Other adverse effects: No data available.

Section 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.

Contaminated packaging: Dispose of as unused product.

Section 14: Transport Information

DOT (US): Not regulated as a hazardous material.

IMDG: Not regulated as a hazardous material.

IATA: Not regulated as a hazardous material.

Section 15: Regulatory Information

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 compounds (Manganese Dioxide, CAS No. 1313-13-9) are subject to SARA 313 reporting.

SARA ³¹¹/₃₁₂ Hazards: Acute Health Hazard, Chronic Health Hazard.

Massachusetts Right To Know Components: No components are subject to the Massachusetts Right to Know Act.

Pennsylvania Right To Know Components:

- Manganese Dioxide (CAS No. 1313-13-9)

New Jersey Right To Know Components:

- Manganese Dioxide (CAS No. 1313-13-9)

California Prop. 65 Components: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Section 16: Other Information

Further information: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. BTLnewmaterial and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product.

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References: [1] Sigma-Aldrich. (n.d.). *Manganese(IV) oxide*. Retrieved from <https://www.sigmaaldrich.com/US/en/product/aldrich/230185> [2] PubChem. (n.d.). *Manganese dioxide*. Retrieved from <https://pubchem.ncbi.nlm.nih.gov/compound/Manganese-dioxide>