

1. Identification

Product identifier	Tronox® Lithium Manganese Oxide
Other means of identification	
SDS number	B-5079
Product code	Lithium manganese oxide
Recommended use	Cathode material for lithium ion batteries.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Company name	Tronox LLC
Address	3301 NW 150th Street Oklahoma City, OK 73134 USA
Email	ChemProdSteward@tronox.com
Telephone	+1-405-775-5000 (24-hours)
Emergency telephone number	+1-877-358-7421 +1-760-476-3962 (Access code: 333318)

2. Hazard(s) identification

Physical hazards	Not classified.
Health hazards	Not classified.
OSHA defined hazards	Not classified.
Label elements	
Hazard symbol	None.
Signal word	None.
Hazard statement	None.
Precautionary statement	
Prevention	Observe good industrial hygiene practices.
Response	Flush skin thoroughly with water.
Storage	Store away from incompatible materials.
Disposal	Dispose of waste and residues in accordance with local authority requirements.
Hazard(s) not otherwise classified (HNOC)	Dusts may irritate the respiratory tract, skin and eyes. Inhalation of manganese oxide dust/fumes may cause metal fume fever. The symptoms are shivering, fever, malaise and muscular pain. Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes.

3. Composition/information on ingredients

Substances

Chemical name	Common name and synonyms	CAS number	%
Lithium manganese oxide		12057-17-9	100

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation	Move to fresh air. Get medical attention if any discomfort continues.
Skin contact	Flush skin thoroughly with water. Get medical attention if irritation develops and persists.
Eye contact	Do not rub eyes. Flush area with plenty of water. If irritation occurs, get medical assistance.

Ingestion	Rinse mouth thoroughly. Do not induce vomiting without advice from poison control center. Never give anything by mouth to an unconscious person. If ingestion of a large amount does occur, call a poison control center immediately.
Most important symptoms/effects, acute and delayed	Dusts or powder may irritate the respiratory tract, skin and eyes. Coughing. Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Use fire-extinguishing media appropriate for surrounding materials.
Unsuitable extinguishing media	No restrictions known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.
General fire hazards	Not itself combustible but assists fire in burning materials.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Avoid dust formation. Avoid inhalation of dust and contact with skin and eyes. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
Methods and materials for containment and cleaning up	Stop leak if you can do so without risk. Collect powder using special dust vacuum cleaner with particle filter or carefully sweep into closed container.
Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not contaminate water.

7. Handling and storage

Precautions for safe handling	Use work methods which minimize dust production. Avoid inhalation of dust and contact with skin and eyes. Use only with adequate ventilation. Wash thoroughly after handling.
Conditions for safe storage, including any incompatibilities	Store in tightly closed original container in a dry and cool place. Store away from incompatible materials (See Section 10).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Lithium manganese oxide (CAS 12057-17-9)	Ceiling	5 mg/m ³

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Lithium manganese oxide (CAS 12057-17-9)	TWA	0.1 mg/m ³	Inhalable fraction.
		0.02 mg/m ³	Respirable fraction.

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value	Form
Lithium manganese oxide (CAS 12057-17-9)	STEL	3 mg/m ³	Fume.
	TWA	1 mg/m ³	Fume.

Biological limit values	No biological exposure limits noted for the ingredient(s).
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Appropriate engineering controls	Ventilate as needed to control airborne dust. Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust.
Individual protection measures, such as personal protective equipment	
Eye/face protection	Wear dust-resistant safety goggles where there is danger of eye contact.
Skin protection	
Hand protection	Wear protective gloves. Suitable gloves can be recommended by the glove supplier.
Other	Wear appropriate clothing to prevent repeated or prolonged skin contact.
Respiratory protection	In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. When engineering controls are not sufficient to lower exposure levels below the applicable exposure limit, use a NIOSH approved respirator for dusts. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever work place conditions warrant a respirator's use. Seek advice from local supervisor.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Do not breathe dust. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	Powder.
Physical state	Solid.
Form	Powder.
Color	Black.
Odor	None.
Odor threshold	Not applicable.
pH	Not available.
Melting point/freezing point	> 1832 °F (> 1000 °C)
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not applicable.
Vapor density	Not applicable.
Relative density	4 - 5 at 20°C
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not applicable.
Other information	
Bulk density	78 lb/ft ³

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable under normal temperature conditions.

Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Avoid incompatible materials and intense heat. When subjected to intense heat, it will release oxygen which would increase the intensity of a fire.
Incompatible materials	Organic material. Combustible material. Strong reducing agents. Strong oxidizing agents. Halogens.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Dust irritates the respiratory system, and may cause coughing and difficulties in breathing. Inhalation of manganese oxide dust/fumes may cause metal fume fever. The symptoms are shivering, fever, malaise and muscular pain.
Skin contact	Dust may irritate skin. Skin irritation occurs on contact with moist or wet skin.
Eye contact	May cause eye irritation on direct contact.
Ingestion	May cause discomfort if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics Dusts or powder may irritate the respiratory tract, skin and eyes. Coughing. Frequent inhalation of dust over a long period of time increases the risk of developing lung diseases.

Information on toxicological effects

Acute toxicity	May cause discomfort if swallowed.
Skin corrosion/irritation	Dust may irritate skin. Skin irritation occurs on contact with moist or wet skin.
Serious eye damage/eye irritation	May cause eye irritation on direct contact.

Respiratory or skin sensitization

Respiratory sensitization	No data available.
Skin sensitization	Not a skin sensitizer.

Germ cell mutagenicity Knowledge about mutagenicity is incomplete.

Carcinogenicity No data available.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity Knowledge about reproductive effects is incomplete.

Specific target organ toxicity - single exposure No data available.

Specific target organ toxicity - repeated exposure No data available.

Aspiration hazard Due to the physical form of the product it is not an aspiration hazard.

Further information Chronic exposure to breathing low levels of manganese dust or fume over a long period of time can result in "manganism," a disease of the central nervous system similar to Parkinson's Disease, gait impairment, muscle spasms and behavioral changes. Frequent inhalation of dust over a long period of time increases the risk of developing asthma, chronic lung diseases, and skin irritation.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	The degradability of the product has not been stated.
Bioaccumulative potential	No data available on bioaccumulation.
Mobility in soil	No data available.
Other adverse effects	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. Disposal considerations

Disposal instructions Dispose of this material and its container to hazardous or special waste collection point. Do not allow this material to drain into sewers/water supplies. Dispose of waste and residues in accordance with local authority requirements.

Local disposal regulations	Dispose of in accordance with local regulations.
Hazardous waste code	Not regulated.
Waste from residues / unused products	Dispose of waste at a facility with special permission to dispose industrial wastes. Waste should be accompanied by a manifest for the industrial waste. Do not discharge into rivers, lakes, mountains, etc. because the product may affect the environment.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Lithium manganese oxide (CAS 12057-17-9) 1.0 % One-Time Export Notification only.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Lithium manganese oxide (CAS 12057-17-9) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - No
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Lithium manganese oxide	12057-17-9	100

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Lithium manganese oxide (CAS 12057-17-9)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Lithium manganese oxide (CAS 12057-17-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Lithium manganese oxide (CAS 12057-17-9)

US. California Proposition 65

Not Listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	No
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).

A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	27-March-2015
Revision date	-
Version #	01
Further information	HMIS® is a registered trade and service mark of the NPCA.
HMIS® ratings	Health: 0 Flammability: 0 Physical hazard: 0
References	HSDB® - Hazardous Substances Data Bank IARC Monographs. Overall Evaluation of Carcinogenicity (Volumes 1-106)
Disclaimer	The information in the sheet was written based on the best knowledge and experience currently available.