

1. Product and company identification

Product name	Tronox® Lithium Manganese Oxide
Product code	Lithium manganese oxide
Manufacturer/Supplier	
Company name	Tronox LLC 3301 NW 150th Street Oklahoma City, OK 73134
Country	USA
Email	ChemProdSteward@tronox.com
Telephone	+1-405-775-5000 (24-hours)
Emergency telephone number	+1-760-476-3960 (Access code 333318)

Recommended use and Limitations on use

Recommended use	Cathode material for lithium ion batteries.
MSDS number	B-5079

2. Hazards identification

Hazard classification	
Physical hazards	Not classified.
Health hazards	Not classified.
Environmental hazards	Not classified.
Label elements	
Symbols	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.
Other hazards	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

Substance or mixture	Substance		
Chemical name	CAS Number	Concentration (%)	
Lithium manganese oxide	12057-17-9	90 - 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

First aid measures for different exposure routes

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	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 and effects	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.

Personal protection for first-aid responders Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.
Notes to physician Treat symptomatically.

5. Fire-fighting measures

Extinguishing media Use fire-extinguishing media appropriate for surrounding materials.
Extinguishing media to avoid No restrictions known.
Specific hazards during fire fighting During fire, gases hazardous to health may be formed.
Special fire fighting procedures 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.
Protection of fire-fighters 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.

6. Accidental release measures

Personal precautions 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. Use Personal Protective Equipment recommended in Section 8 of the MSDS.
Environmental precautions Prevent further leakage or spillage if safe to do so. Do not contaminate water.
Spill cleanup methods 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. For waste disposal, see Section 13 of the MSDS.

7. Handling and storage

Handling

Technical measures Use work methods which minimize dust production.
Local and general ventilation Use only with adequate ventilation. Provide adequate general and local exhaust ventilation.
Precautions Avoid inhalation of dust and contact with skin and eyes.
Safe handling advice Use Personal Protective Equipment recommended in section 8 of the MSDS. Wash hands thoroughly after handling.

Storage

Technical measures Store in a well-ventilated place.
Suitable storage conditions Store in tightly closed original container in a dry and cool place.
Incompatible materials Store away from incompatible materials (See Section 10).
Safe packaging materials Keep in original container.

8. Exposure controls/personal protection

Exposure limits

Taiwan. OELs. (Standards on Workplace Atmosphere of Dangerous and Hazardous Materials)

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.

Engineering measures Ventilate as needed to control airborne dust. Provide adequate ventilation. Observe Occupational Exposure Limits and minimize the risk of inhalation of dust.

Personal protective equipment

Respiratory protection In case of inadequate ventilation or risk of inhalation of dust, use suitable respiratory equipment with particle filter. Seek advice from local supervisor.
Hand protection Wear protective gloves. Suitable gloves can be recommended by the glove supplier.
Eye protection Wear dust-resistant safety goggles where there is danger of eye contact.
Skin and body protection Wear appropriate clothing to prevent repeated or prolonged skin contact.

Hygiene measures

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)
Boiling point, initial boiling point, and boiling range	Not available.
Flash point	Not available.
Auto-ignition temperature	Not available.
Flammability (solid, gas)	Not available.
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.
Evaporation rate	Not available.
Relative density	4 - 5 at 20°C
Density	Not available.
Solubility	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable.
Decomposition temperature	Not available.
Bulk density	78 lb/ft ³
Viscosity	Not applicable.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Stability	Stable under normal temperature conditions.
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.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological information

Acute toxicity	May cause discomfort if swallowed.
Routes of exposure	Inhalation. Ingestion. Eye contact. Skin contact.
Symptoms	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.
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 sensitizer	No data available.
Skin sensitizer	Not a skin sensitizer.
Germ cell mutagenicity	Knowledge about mutagenicity is incomplete.
Carcinogenicity	No data available.

ACGIH Carcinogens

Lithium manganese oxide (CAS 12057-17-9)

A4 Not classifiable as a human carcinogen.

Toxic to reproduction	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.
Chronic effects	Not available.
Other 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.
Bioaccumulation	No data available on bioaccumulation.
Mobility in soil	The product is insoluble in water.
Other hazardous effects	An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

13. Disposal considerations

Residual 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.
Local disposal regulations	Dispose of waste and residues in accordance with local authority requirements.

14. Transport information

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

Applicable regulations

Regulation of Labeling and Hazard Communication of Dangerous and Toxic Substances: Dangerous Materials Classification

Not listed.

Regulation of Labeling and Hazard Communication of Dangerous and Toxic Substances: Toxic Materials Classification

Lithium manganese oxide (CAS 12057-17-9) Specific Hazardous Chemical

Methods and Facilities Standards for the Storage, Clearance and Disposal of Industrial Waste

Not listed.

Standards on Workplace Atmosphere of Dangerous and Hazardous Materials

Lithium manganese oxide (CAS 12057-17-9) Listed.

Guidelines for Prevention of Danger Posed by Specified Hazardous Chemicals

Lithium manganese oxide (CAS 12057-17-9) Class 3 Category C

16. Other information

References

HSDB® - Hazardous Substances Data Bank
 IARC Monographs. Overall Evaluation of Carcinogenicity (Volumes 1-106)
 Taiwan. Industrial Precursor Chemicals (Categories and Regulations Governing Inspection and Declaration of Industrial Precursor Chemicals, MOEA Decree No. 87, as amended)
 Taiwan. OELs. (Standards on Workplace Atmosphere of Dangerous and Hazardous Materials)
 Taiwan. Dangerous Materials (Rules on Hazard Communication of Dangerous Materials and Toxic Materials)

Issued by Not Available

Prepared by Not Available

Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available.

Issue date

27-March-2015

Revision date

-