



CHEMICAL PRODUCT SAFETY DATA SHEET

Prepared in accordance with GB/T 16483 and GB/T 17519.

1. Chemical product and company identification

Product name	Tronox® Lithium Manganese Oxide
Product code	Lithium manganese oxide
Manufacturer	
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	+86 4001 2001 74 (Access code 333318) In China: +86-421-2976013 (24 hours)

Recommended use and Limitations on use

Recommended use	Cathode material for lithium ion batteries.
Issue date	27-March-2015
Revision date	-
Supersedes date	-
SDS No	B-5079

2. Hazards identification

Emergency overview Dust may irritate the respiratory tract, skin and eyes.

GHS-classification

Not classified.

Label elements

Pictograms	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.

Physical and chemical hazards Material is stable under normal conditions.

Health hazards Inhalation of dusts may cause respiratory irritation. Inhalation of manganese oxide dust/fumes may cause metal fume fever. The symptoms are shivering, fever, malaise and muscular pain.

Environmental hazards 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.

Other hazards 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/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

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 and health 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.
Expected acute symptoms and delayed symptoms	Coughing. May cause irritation through mechanical abrasion.
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, 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, protective equipment and emergency procedures

For non-emergency personnel	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 SDS.
For emergency responders	Keep unnecessary personnel away. Use personal protection recommended in Section 8 of the SDS.

Environmental precautions	Prevent further leakage or spillage if safe to do so. Do not contaminate water.
Clean-up methods and materials and containment measures	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 SDS.
Prevention of secondary hazards	Stop leak if possible without any risk.

7. Handling and storage

Handling	Use work methods which minimize dust production. Avoid inhalation of dust and contact with skin and eyes. Use only with adequate ventilation. Use Personal Protective Equipment recommended in section 8 of the SDS. Wash thoroughly after handling.
Storage	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

Exposure limits

China

Components

	Type	Value
Lithium manganese oxide (CAS 12057-17-9)	TWA	0.15 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

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.
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
Density	Not available.
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Other data	
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.
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

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 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.
Toxic to reproduction	Knowledge about reproductive effects is incomplete.
Specific target organ toxicity following single exposure	No data available.
Specific target organ toxicity following 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	Do not allow this material to drain into sewers/water supplies. Dispose of waste and residues in accordance with local authority requirements.

14. Transport information

CNDG

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

Inventory of Existing Chemical Substances in China

Country(s) or region	Inventory name	On inventory (yes/no)*
China	Inventory of Existing Chemical Substances in China (IECSC)	No

*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).

Applicable regulations

Highly Toxic Chemicals List

Lithium manganese oxide (CAS 12057-17-9)

Occupational exposure limits for hazardous agents in the workplace (GBZ 2.1-2007)

Lithium manganese oxide (CAS 12057-17-9)

Restricted Import/Export Toxic Chemical List (MEP and GCA Announcement No. 2008-66, Dec. 1, 2008, amended through MEP and Customs Notice No. 2011-91, December 28, 2011)

Not regulated.

Classification and code of dangerous goods (GB 6944-2012)

Not regulated.

UN Recommendations on the Transport of Dangerous Goods (UN RTDG)

Not regulated.

16. Other information

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.