

## 1. Chemical and company identification

<b>Name of chemical (Product name)</b>	<b>Tronox® Lithium Manganese Oxide</b>
<b>Manufacturer/Supplier</b>	
<b>Company name</b>	Tronox LLC 3301 NW 150th Street Oklahoma City, OK 73134
<b>Country</b>	USA
<b>Email</b>	ChemProdSteward@tronox.com
<b>Telephone</b>	+1-405-775-5000 (24-hours)
<b>Emergency telephone number</b>	+1-760-476-3960 (Access code 333318)
<b>Product code</b>	Lithium manganese oxide
<b>Recommended use of the chemical and restrictions on use</b>	
<b>Intended use</b>	Cathode material for lithium ion batteries.
<b>Reference number</b>	B-5079

## 2. Hazards identification

### GHS classification

The product is not classified according to GHS.

### GHS label elements

<b>Symbols</b>	None.
<b>Signal words</b>	None.
<b>Hazard statement</b>	None.

### Precautionary statement

<b>Prevention</b>	Observe good industrial hygiene practices.
<b>Response</b>	Flush skin thoroughly with water.
<b>Storage</b>	Store away from incompatible materials.
<b>Disposal</b>	Dispose of waste and residues in accordance with local authority requirements.

### Other hazards which do not result in classification

Dusts may irritate the respiratory tract, skin and eyes. 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

Components	CAS Number	Gazette notification		Concentration (%)
		ENCS no.	ISHL no.	
Lithium manganese oxide	12057-17-9			100

**Chemical formula**                      Li.Mn.O (12057-17-9)

**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

<b>If inhaled</b>	Move to fresh air. Get medical attention if any discomfort continues.
<b>If on skin</b>	Flush skin thoroughly with water. Get medical attention if irritation develops and persists.
<b>If in eyes</b>	Do not rub eyes. Flush area with plenty of water. If irritation occurs, get medical assistance.
<b>If swallowed</b>	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.
<b>Most important symptoms/effects, acute and delayed</b>	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.

**Protection of 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.

**General fire hazards** Not itself combustible but assists fire in burning materials.

## 6. Accidental release measures

**Personal precautions, protective equipment and emergency measures** 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.

**Environmental precautions** Prevent further leakage or spillage if safe to do so. Do not contaminate water.

**Methods or 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. 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

**Technical measures (e.g. Local and general ventilation)** Use only with adequate ventilation. Provide adequate general and local exhaust ventilation.

**Safe handling advice** Avoid inhalation of dust and contact with skin and eyes. Use personal protection recommended in Section 8 of the SDS. Wash hands thoroughly after handling.

**Contact avoidance measures** Store away from incompatible materials (See Section 10).

**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.

### Storage

**Safe storage conditions** Store in tightly closed original container in a dry and cool place.

**Safe packaging materials** Keep in original container.

## 8. Exposure controls/personal protection

### Occupational exposure limits

#### Japan. OELs - ISHL. (Workplace Environment Assessment Standards)

Components	Type	Value
Lithium manganese oxide (CAS 12057-17-9)	TLV	0.2 mg/m <sup>3</sup>

#### Japan. OELs - JSOH (Japan Society of Occupational Health: Recommendation of Occupational Exposure Limits)

Components	Type	Value
Lithium manganese oxide (CAS 12057-17-9)	TWA	0.2 mg/m <sup>3</sup>

#### US. ACGIH Threshold Limit Values

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

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

## 9. Physical and chemical properties

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

## 10. Stability and reactivity

<b>Reactivity</b>	The product is stable and non-reactive under normal conditions of use, storage and transport.
<b>Chemical stability</b>	Stable under normal temperature conditions.
<b>Possibility of hazardous reactions</b>	Hazardous polymerization does not occur.
<b>Conditions to avoid</b>	Avoid incompatible materials and intense heat. When subjected to intense heat, it will release oxygen which would increase the intensity of a fire.
<b>Incompatible materials</b>	Organic material. Combustible material. Strong reducing agents. Strong oxidizing agents. Halogens.
<b>Hazardous decomposition products</b>	No hazardous decomposition products are known.

## 11. Toxicological information

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

### ACGIH Carcinogens

Lithium manganese oxide (CAS 12057-17-9) A4 Not classifiable as a human carcinogen.

**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.

**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.

**Hazardous to the ozone layer** The product is not volatile but may be spread by dust-raising handling.

**Other hazardous effects** An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

## 13. Disposal considerations

**Residual waste** 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.

**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

### Industrial Safety and Health Act

#### Notifiable substances

MANGANESE AND MANGANESE COMPOUNDS 95 - 100 %

#### Labeling substances

Not regulated.

### Poisonous and Deleterious Substances Control Act

#### Specified poisonous substances

Not regulated.

#### Poisonous substances

Not regulated.

#### Deleterious substances

Not regulated.

### Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.

#### Class I specified chemical substances

Not regulated.

**Class II specified chemical substances**

Not regulated.

**Monitoring chemical substances**

Not regulated.

**Priority Assessment Chemical Substances (PACs)**

Not regulated.

**Law concerning Pollutant Release and Transfer Register**

**Specified class 1 substances (substance name, ordinance number and content)**

Not regulated.

**Class 1 substances (substance name, ordinance number and content)**

MANGANESE AND ITS COMPOUNDS      Ordinance No. 412    100 %      (Lithium manganese oxide)

**Class 2 substances (substance name, ordinance number and content)**

Not regulated.

**Ship Safety Law, Dangerous Goods Marine Transport and Storage Rule**

Not regulated.

**Air Law, Enforcement Rule**

Not regulated.

**Explosives Control Act**

Not regulated.

**16. Other information**

**Bibliography**

HSDB® - Hazardous Substances Data Bank

IARC Monographs. Overall Evaluation of Carcinogenicity (Volumes 1-106)

JIS Z 7250: 2005 Safety data sheet for chemical products-Part 1:Content and order of sections

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