



SAFETY DATA SHEET

STABILIZED LITHIUM METAL POWDER

1. Identification of the Substance/Mixture and of the Company/Undertaking:

- 1.1 **Product Identifier:** Stabilized Lithium Metal Powder
- 1.1.1 **Substances** Not applicable
- 1.1.2 **Mixture name:** Stabilized Lithium Metal Powder
- Alternate names and trade name** SLMP ®
- 1.2 **Relevant Identified Uses of the Substance or Mixture and Uses Advised Against:**
Additive for preparations and articles for industrial and consumer use;
Component in lithium batteries.
For use under controlled conditions
Do not use for private purposes (household).
- 1.3 **Details of the Supplier of the Safety Data Sheet**

North America
FMC Corporation
2801 Yorkmont Road, Suite 300
Charlotte, NC 28208
Phone: +1.704.426.5300
Fax: +1.704.426.5370
1.888.lithium

Europe
FMC Chemicals
Commercial Road
Bromborough, Merseyside
CH62 3NL, England
Phone: +44.151.334.8085
Fax: +44.151.482.7361

Asia Pacific
FMC Asia Innovation Center
No 3 Building No. 4560
Jinke Road
Shanghai, China 201203
T: +86.21.2067.5888

Email: lithium.info@fmc.com
Web: www.fmclithium.com

1.4 **Emergency Telephone Number:**

North America
CHEMTREC: +1.800.424.9300
+1.703.527.3887
Plant: +1.704.629.5361
Medical: +1.303.595.9048

Europe
24 hr Specialist advice number:
CHEMTREC: +44 870 8200418

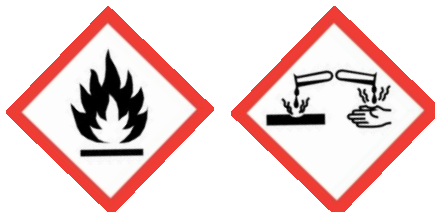
Asia Pacific
Phone: +86.21.2067.5888

2. Hazards Identification

- 2.1 **Classification of the Substance or mixture:**
2.1.1 GHS Classification [EC Regulation No 1272/2008 and US OSHA regulations]
Water-reactive, Category 1
Corrosive to skin, Category 1B
Eye damage; Category 1
Self-heating solid, Category 1
- 2.2.2 EC: Classification according to 67/548/EEC or 1999/45/EC [DSD/DPD]**
F, R14/15; C, R34

2.2 **Label Elements:**

2.2.3 Hazard Pictograms(s):



2.2.4 Signal Word:

Danger

Hazard Statement(s):

In contact with water releases flammable gases which may ignite spontaneously H260
Causes severe skin burns and eye damage H314
Self-heating; may catch fire. H251

Precautionary Statement(s):

Keep away from any possible contact with water, because of violent reaction and possible flash fire. P223
Handle under inert gas. Protect from moisture. P231 + P232

Keep cool. Protect from sunlight. P235 + P410
Wear protective gloves/protective clothing/eye protection/face protection. P280
In case of fire: Use graphite, copper powder, Lith-X (Ansul) for extinction. P370 + P378
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. P303 + P361 +
Rinse skin with water/shower. P353
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact P305 + P351 +
lenses, if present and easy to do. Continue rinsing. P338
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P301 + P330 +
P331
P310
Immediately call a POISON CENTER or doctor/physician.
Additional Precautionary Phrase(s):
Do not breathe dust/fume/gas/mist/vapours/spray. P260
Wash hands thoroughly after handling. P264
IF INHALED: Remove victim to fresh air and keep at rest in a position P304 + P340
comfortable for breathing.
Wash contaminated clothing before reuse. P363
Store in a dry place. Store in a closed container. P402 + P404
Store locked up. P405
Maintain air gap between stacks/pallets. P407
Store away from other materials. P420
Dispose of contents/ container to an approved waste disposal plant. P501

2.3 Other Hazards

May form combustible dust concentrations in air.
Reacts violently with water EUH014

3. Composition / Information on Ingredients

3.1 Substances Not applicable.

3.2 Mixtures

3.1.1 GHS Classification [EC: Regulation No 1272/2008; US: OSHA regulations]

Chemical Name	CAS #	EC No	EC Index No	REACH Reg No	Wt. %	Classification, Hazard Statement Codes
lithium metal	7439-93-2	231-102-5	003-001-00-4	01-2119966143-38-0000	97.0-99.9	Water-react. 1 Skin Corr. 1B H260 H314 EUH014
lithium carbonate	554-13-2	209-062-5	none	01-2119516034-53-0005	0.1 - 2.5	Acute Tox. 4 Skin Irrit. 3 H302 H319
lithium oleate	7384-22-7	230-960-8	none	Not available	0.01 - 2.5	Acute Tox. 4 Skin Irrit. 3 H302 H319

3.1.2 EC: Classification according to 67/548/EEC or 1999/45/EC [DSD/DPD]

Chemical Name	CAS #	EC No	Wt. %	Symbols	R-phrases
lithium	7439-93-2	231-102-5	99-100	F C	R15 R14 R34
lithium carbonate	554-13-2	209-062-5	0.1 - 2.5	Xn Xi	R22 R36
lithium oleate	7384-22-7	230-960-8	0.01 - 2.5	Xn Xi	R22 R36

(see Section 16 for R-phrases text)

4. First Aid Measures

4.1 Description of First Aid Measures

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Quickly wipe off as much as possible, then immediately flush with plenty of water while removing contaminated clothing and/or shoes. Thoroughly wash with soap and water. Obtain immediate medical attention. Contact a medical doctor if necessary.

INGESTION: Quickly wipe material from the mouth and rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.
INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, see a medical doctor. If breathing has stopped, give artificial respiration and see a medical doctor immediately.

4.2 Most Important Symptoms and effects, both acute and delayed

Lithium metal reacts violently with water and is corrosive to the eyes, skin and respiratory tract. Treatment should first remove as much of the material as possible as quickly as possible, then flush with very large quantities of water.

4.3 Indication of any immediate medical attention and special treatment needed.

Notes to medical doctor:

This product is corrosive and reacts violently with water. Treatment should first remove as much of the material as possible as quickly as possible, then flush with very large quantities of water. Ingestion presents a singular problem as emesis may produce esophageal damage and/or aspiration damage; dilution with water or other water-containing materials may produce a reaction that exacerbates the corrosive activity. Consideration may be given to gastric lavage with a large diameter tube for removal of material and then dilution with large amounts of water. Esophagoscopy may be of assistance in this procedure and to assess extent of damage. Treatment is otherwise symptomatic and supportive.

5. Fire-Fighting Measures

5.1 Extinguishing media

DO NOT USE WATER, SAND OR CARBON DIOXIDE. Use graphite, copper powder, Lith-X (Ansul). If not available, dry sodium chloride, dry (anhydrous) calcium oxide or dry lithium chloride can be used.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products

Lithium oxide, lithium hydroxide

General Hazard

Flammable solid. Water reactive. Combustible dust. Dust explosion hazard.

Properties contributing to Flammability

Water reactivity of solid and flammable hydrogen gas given off on reaction with moisture. Exposable dust – May form combustible dust concentrations in air.

Flashpoint

Not applicable

Flammable limits in air

Not a flammable liquid. However, contains a combustible dust. Minimum Exposable Concentration for dust: 30-40 g/m³

Auto ignition temperature

Minimum ignition temperature for dust layer is 160 °C

Sensitivity to static discharge

Yes. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source, is a potential dust explosion hazard. SLMP is sensitive to static ignition. Yes

5.3 Sensitivity to static impact

Advice for fire-fighters

Wear full protective clothing and self-contained breathing apparatus (SCBA) approved for fire fighting. This is necessary to protect against the hazards of heat, products of combustion and oxygen deficiency. Do not breathe smoke, gases or vapors generated.

Lithium fires can throw off molten lithium metal particles. Burning lithium releases corrosive lithium oxide dust and fumes. Lithium metal can reignite after fire is initially extinguished. Never leave extinguished fire unattended. After all material has apparently burned and cooled, carefully turn over remaining residue and be prepared to re-extinguish should reaction occur. Carefully place residue in steel drum, using a long-handled, non-sparking shovel, and cover with extinguishing media.

Explosion hazard: Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

For additional fire fighting information, see National Fire Protection Assn. Standard NFPA 485.

COMMENTS:

(See Section 10, Stability and Reactivity)

6. Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Before cleanup measures begin, review the entire SDS with particular attention to Section 2, Hazards Identification; and Section 8, Exposure Controls/Personal Protection.

6.2 Environmental precautions

Do not wash into drains. Dispose of at a qualified waste disposal facility.

6.3 Methods and material for containment and cleaning up

Remove all sources of ignition. To prevent ignition, cover with mineral oil (or kerosene), soaking thoroughly, and place in oiled steel drums which are approved for transport. Keep water and moisture away from spilled material. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Dispose of waste according to local and Federal laws and regulations.

6.4 Reference to other sections

Before cleanup measures begin, review the entire SDS with particular attention to Section 2, Hazards Identification; and Section 8, Exposure Controls/Personal Protection.

6.5 Additional information

Not specified.

7. Handling and Storage

7.1 Precautions for safe handling

For bulk containers, wear goggles or safety glasses and face shield in vented area with fume/dust abatement, or a full face respirator. Wear fire-retardant clothing. Wear dry, gauntlet style rubber gloves. Use proper anti-static precautions including grounding of all containers, equipment, tools, and operators. Dust abatement system should allow for safe disposal of any accumulated dust (e.g., filter disposal). Proper fire suppression systems should be in place. Transfer of bulk quantities should be performed under a dry argon atmosphere with proper mitigation of dust. Store sealed containers in climate-controlled area, away from excessive moisture and humidity, with fire suppression system in place.

For small amounts (< 0.1 kg) wear safety glasses and some additional face protection (may include goggles (in place of glasses), face shield, or fume hood sash in proper position. An appropriate dust mask should be used. Alternatively, an argon glovebox can be used. Some dust abatement should be in place (e.g., fume hood). Dust abatement system should allow for safe disposal of any accumulated dust (e.g., filter disposal). Use chemical resistant gloves such as nitrile (also can be anti-static). Wear fire-retardant clothing. Use proper anti-static precautions including bonding and grounding of all containers, equipment, tools, and operators where possible. Proper fire suppression should be in place. Transfers should be made under argon when possible, although handling briefly under a dry air atmosphere (relative humidity < 1%) is acceptable when applying the material for use.

7.2 Conditions for safe storage, including any incompatibilities

Store sealed containers in dry climate controlled location with fire suppression system. Keep away from water, humid air, acids, oxidizing materials, and flammable material. Keep away from heat, sparks, and flame. Ground bulk containers.

7.3 Specific end use(s)

Not available. Chemical safety assessment has not been completed for this product.

8. Exposure Controls / Personal Protection

8.1 Control parameters

Lithium metal

DNEL

Long-term exposure, systemic, inhalation 4.2 mg/m³
 Long-term exposure, systemic, dermal 12 mg/kg/day

PNEC

PNEC aqua (freshwater) 0.165 mg/l
 PNEC aqua (freshwater, intermittent) 1.65 mg/l
 PNEC STP 23 mg/l

EXPOSURE LIMITS

Chemical Name	EU		EH40 (UK WEL)		USA (ACGIH)		USA (OSHA)	
	TWA	STEL	TWA	STEL	TWA	STEL/Ceiling	PEL	STEL/Ceiling
lithium	none*		none*		none*		none*	

* No occupational exposure limit value

8.2 Exposure controls

Engineering controls:

Use local exhaust ventilation to keep airborne concentrations below exposure limits.

Personal protective equipment

Eyes and Face:

Safety glasses with face shield or goggles for general use. Goggles and full flame-resistant face shield when handling bulk powders without fume hood sash or other protective barrier.

Respiratory:

Dust mask for small amounts or full face respirator for bulk quantities if proper exhaust is not present

Protective Clothing:

Eyes: Safety glasses with face shield or goggles for general use. Goggles and full flame-resistant face shield when handling bulk powders without fume hood sash or other protective barrier..

Gloves: Chemical resistant gloves (e.g., nitrile) for small quantities. Dry, gauntlet style rubber gloves for bulk handling.

Other: Body: Fire-retardant clothing
Grounding straps or other means of grounding person to prevent static charge (e.g., gloves, shoes, mats).

Work Hygienic

Practices:

Quick-drench eyewash and safety shower (although at a distance wherein water does not come into contact with material inadvertently)

9. Physical and Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance:

Gray, free-flowing powder

Odor:

No characteristic odor, but dust may form lithium hydroxide in the air which is irritating to the respiratory tract at low concentrations.

Odor threshold:

Not applicable

pH:

Reaction with water creates a highly alkaline solution pH>12

Melting point:

Li metal: 180.5°C (Li metal with 1% Na has a melting point 2-3 °C lower than pure Li)

Boiling point:

1317°C (Li metal)

Flash point:

Not applicable

Evaporation rate(butyl acetate = 1):

Not applicable

Flammability:

Reacts with water to produce hydrogen, a flammable gas.

Flammable limits:

Not applicable

Vapor pressure:

Not applicable

Vapor density (air = 1):

Not applicable

Specific gravity:

0.5 g/ml (lithium metal) (bulk density, SLMP: 0.25 g/ml)

Solubility in water:

Reacts violently with water

Partition coefficient n-octanol/ water:

Not applicable

Auto ignition temperature

Minimum ignition temperature for dust layer is 160 °C

Decomposition temperature:

Not available

Viscosity:

Not available

Explosive properties:

See additional information below.

Oxidizing properties:

Not an oxidizer

9.2 Other information

Self-reactive properties

Does not meet classification criteria.

Pyrophoric properties

Under normal working conditions, does not meet classification criteria.

Self-heating properties

Self-heating solid, Category 1

Water reactive properties

Water-reactive, Category 1

Corrosive to metals

Does not meet classification criteria.

Molecular weight:

6.94 (Li metal)

Additional information on combustible dust, self heating and explosion hazards:

Volume Resistivity (ohm.m) at low humidity = 80

Charge Decay Time (sec) at low humidity = < 1

Modified Self-Heating Substance Test – Positive; UN 4.2, PG II

Maximum Explosion Pressure (barr) = 7.3

Maximum Rate of Pressure Rise (bar/s) = 431

Kst Value (bar.m/s) = 117

Minimum Ignition Energy – Dust cloud (mJ) = < 3

Minimum Ignition Temperature – Dust Layer (°C) = 160 – 180

(argon diluent gas)
Limiting Oxygen Concentration (% by volume) = 0.75 – 1.0
Minimum Exposable Concentration (g/m³) = 30 – 40

10. Stability and Reactivity

10.1	<u>Reactivity</u>	Reacts violently with water, producing flammable hydrogen gas.
10.2	<u>Chemical stability</u>	Stable when kept dry and under argon gas.
10.3	<u>Possibility of hazardous reaction</u>	Reacts violently with water, producing flammable hydrogen gas. Stabilized lithium metal powder can self heat if stored in contact with ambient air. Store under argon. Hazardous polymerization will not occur.
10.4	<u>Conditions to avoid</u>	Temperatures above the melting point (180.5°C/357°F), or contact with water, moisture or humid air. Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source, is a potential dust explosion hazard. SLMP is sensitive to static ignition.
10.5	<u>Incompatible materials</u>	Water, acids, oxidizers, oxygen, nitrogen, carbon dioxide, or protic solvents, or polar solvents
10.6	<u>Hazardous decomposition products</u>	Lithium is an element and does not decompose. However, it is highly reactive in contact with many other substances, releasing large quantities of heat and/or hazardous products. It can react violently with water, the humidity in air, and the moisture in other substances, releasing hydrogen gas, which may catch fire explosively. Corrosive fumes of lithium oxide and/or lithium hydroxide are also released.

11. Toxicological Information

11.1 **Information on toxicological effects**

Lithium:

(a) acute toxicity	Based on the available data, the classification criteria are not met.
(b) skin corrosion/irritation	Classified as corrosive to skin on the basis of lithium.
(c) serious eye damage/irritation	Classified as corrosive to eyes on the basis of lithium.
(d) respiratory/skin sensitisation	Classed as not sensitizing to skin on the basis of lithium.
(e) germ cell mutagenicity	Classified as not mutagenic based on lithium.
(f) carcinogenicity	Classified as not carcinogenic based on lithium.
(g) reproductive toxicity	Classified as not a reproductive toxin based on lithium.
(h) STOT-single exposure	Classified as not causing organ damage based on lithium.
(i) STOT-repeated exposure	Classified as not causing organ damage on repeat exposure based on lithium.
(j) aspiration hazard	Lithium, a solid, does not present an aspiration hazard.

Lithium has been extensively tested for REACH registration

Acute Effects From Overexposure:

This product is extremely reactive with body moisture and is corrosive to skin, nose, throat, stomach and eyes (may cause blindness).

Chronic Effects From Overexposure:

No data available for product.

Carcinogenicity Listings

EH40: Not listed.
IARC: Not listed.
NTP: Not listed.
OSHA: Not considered a carcinogen under OSHA.
ACGIH: Not listed.

12. Ecological Information

TSCA Sec 12b Export Notification:

This product is not subject to TSCA 12 (b) Export Notification Requirements.

NFPA Rating:

Health: 3 Flammability: 3 Reactivity: 2 Special: ~~W~~

INTERNATIONAL INVENTORY STATUS:

<u>Inventory/Country</u>	<u>Product Status</u>
EINECS (EU)	Listed
TSCA (US)	Listed
ECL (Korea)	Listed
DSL (Canada)	Listed

15.2 Chemical Safety Assessment

A Chemical Safety Assessment has been completed for lithium metal.

16. Other Information

European Union:

R Phrases:

R14/15 Reacts violently with water, liberating extremely flammable gases
R34 Causes burns
R22 Harmful if swallowed
R36 Irritating to eyes

List of Abbreviations used in this SDS:

PBT Persistent, Bioaccumulative and Toxic
vPvB very Persistent, very Bioaccumulative
PEC Predicted environmental concentration
PNEC Predicted no effect concentration
DNEL Derived no effect level

Specific uses identified for Exposure Scenarios

ES1 Industrial use organolithium production and pharma synthesis
ES2 Industrial use, battery foils
ES3 Industrial use Li/Al alloys
ES4 Professional laboratory use.

REVISION SUMMARY: Revision # 0. New SDS.

This SDS has been prepared to meet European Regulation (EC) No 1907/2006 [and No 1272/2008], and U. S. OSHA Hazard Communication Standard requirements.

type 5a

Copyright 2015. FMC Corporation. All Rights Reserved. FMC and the FMC logo are trademarks of FMC Corporation.