American Lithium Energy Corporation

F-851-023 Rev. A

Ref # MSDS-027 Rev. A

SAFETY DATA SHEET

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Section I - Product Identification

Product Name:	5.0 / 5.5 Ah 21700 Li-ion Cell	
Model:	ALE18650NMC5000 / 5500	Nominal Voltage: 3.7 V
Chemical System:	Lithium Ion Battery	Designated **for Rechargeable**

Section II - Hazardous Ingredients/Identity information

IMPORTANT NOTE: Do not short circuit, puncture, incinerate, crush, immerse, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion. The Lithium-ion batteries described in this Product Safety Data Sheet are sealed units which are not hazardous when used according to the recommendations of the manufacturer. Under normal conditions of use, the electrode materials and electrolyte they contain are not exposed to the outside, provided the battery integrity is maintained and seals remain intact. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery package. Electrolyte leakage, electrode materials reaction with moisture. Each cell consists of a sealed 18650 metal can containing a number of chemicals and materials of construction of which the following could potentially be hazardous upon release.

Chemical Name	CAS No	PEL	TLV
Si	No establish	No establish	
Graphite (C)	7782-42-5	2.5 mg/m^3 (as dust)	2.5 mg/m^3 (as dust)
Organic solvent (EC/DMC/DEC/EMC)	96-49-1	None established	None established
Lithium salt	21324-40-3	None established	None established
Poly(vinylidene difluoride) (PVdF)	24937-79-9	None established	None established
Doped Lithium Nickel Manganese Oxide	12031-65-1	0.1 mg/m^3 (as dust)	0.02 mg/m^2 (as dust)
Steel can	7439-89-6	None established	None established

Weight of lithium per cell: ~2 g

Section III - Physical/Chemical Characteristics

Specific Gravity: (H_2O=1):	$LiNiCoMnO_2$: >4.4; Graphite:2.09~2.2
Melting Point: (°C):	Not applicable unless individual components exposed
Appearance and dimensions:	Cylindrical shape

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Odor:	If leaking, gives off a corrosive odor
Flash Point:	Not applicable unless individual components exposed
Flammability	Not applicable unless individual components exposed
Solubility (water)	Not applicable unless individual components exposed

Section IV - Fire and Explosion Hazard Data

Flash Point (method used)		:	NA
Flammable limits	- LEL	:	NA
	- PEL	:	NA
Extinguishing Media		:	In case of fire, use carbon dioxide extinguishers. CO_2 extinguishers or, even preferably, copious quantities of water or water-based foam can be used to cool down burning Li-ion cells and batteries.
Special Fire Fighting Procedures		:	Wear NIOSH approved SCBA & full protective equipment.
Unusual Fire and Explosion Hazards		:	Not established

Section V - Health Hazard Data

Route(s) of entry	- Inhalation	:	Not applicable unless individual components exposed
	- Skin	:	Not applicable unless individual components exposed
	- Ingestion	:	Not applicable unless individual components exposed
Hazardous Decomposition or By-Products		:	None, unless battery ruptures. In the event of exposure to internal contents, decomposed fumes may be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.
Hazardous Polymerization		:	No
Health Hazard (Acute and Chronic)		:	Under normal condition of use, these chemicals are contained in sealed bag. Risk of exposure occurs only if battery is mechanically or electrically abused. Content of open battery can cause irritation by inhalation and contact.
Carcinogenicity	- NTP	:	NA
	- IARC monograph	:	NA
	- OSHA regulated	:	NA
Medical conditions generally aggravated by exposure		:	NA

Section VI – First Aid Procedures

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Eye contact	:	For eye contact, flush with copious amount of water for 15 minutes and see physician.
Skin contact	:	Wash with soap and water for skin contact.
Ingestion	:	If ingestion, call medical help immediately.
Inhalation	:	Do not inhale leaked material. If irritation persists, get medical help.
Further treatment		All cases of eye contamination, persistent skin irritation and casualties who have swallowed this substance or been affected by breathing its vapors should be seen by a Doctor.

Section VII – Accidental Release Measures

Leakage	:	Do not breathe vapors or touch liquid with bare hands. If the skin has come into contact with the electrolyte, it should be washed thoroughly with water. Sand or earth should be used to absorb any exuded material, seal leaking battery and contaminated absorbent material in plastic bag and dispose of as Special Waste in accordance with local regulations.

Section VIII - Precaution for Safe Handling, Storage and Use

Steps to be taken in case material is Released or Spilled	:	It is recommended to leave the area and allow the batteries to cool and the vapors to dissipate in a well-ventilated area. Avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate.
Neutralizing agent	:	NA
Waste disposal method	:	Dispose in accordance with appropriate regulations. Open cells should be treated as hazardous waste.
Precaution to be taken in handling and storing	:	Store in cool, well-ventilated area. Do not expose to high temperature (60ºC, 140ºF)
Other precautions	:	Since short circuit can cause burn hazard, do not store with metal jewelry, metal-covered tables/ metal belt. Do not disassemble, model and solder. Do not short positive and negative terminal with metal. Do not open battery. Only charge within limits of 0ºC – 45ºC
Storage		Store in a cool (preferably below 30°C) and ventilated area, away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 90°C may result in battery leakage and rupture. Since short circuit can cause burn, leakage and rupture hazard, keep batteries in original packaging until use and do not jumble them.

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Other	Lithium-ion batteries are rechargeable and should be charged at the recommended charge current. Follow Manufacturers recommendations regarding maximum recommended currents and operating temperature range. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation.

Section IX - Control Measures and Personal Protection

Respiratory protection (Specify type)	:	Not necessary under condition of normal use
Ventilation	:	Not necessary under condition of normal use
Protective gloves	:	Not necessary under condition of normal use
Eye protection	:	Not necessary under condition of normal use
Other protective clothing or equipment	:	Not necessary under condition of normal use
Work/ Hygienic practices	:	Not necessary under condition of normal use
Supplementary safety and health data	:	Discharge within limits of -20°C ~ 50ºC. Since it can cause fire, explosion and burn hazard, do not drop, crush, disassemble, heat over 100ºC (212ºF), incinerate or short circuit.
Other		Wear respiratory protection, hand protection, eye protection in cases of all fire situations

Section X – Stability and Reactivity

Product is stable under normal operation conditions	:	
Conditions to avoid	:	Heat above 70°C or incinerate. Deform. Mutilate. Crush. Pierce. Disassemble. Recharge. Short circuit. Expose over a long period to humid conditions.
Materials to avoid	:	Oxidizing agents, alkalis, water.
Hazardous decomposition Products	:	Hydrogen (H_2) as well as Lithium oxide (Li_2O) and Lithium hydroxide (LiOH) dust is produced in case of reaction of *lithium ion battery* with water. SO_2, H_2SO_3, and H_2S in cases of the reaction of S with oxygen and water

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Section XI – Ecological Information

Mammalian effects	:	None known if used/disposed of correctly
Eco-toxicity	:	None known if used/disposed of correctly
Bioaccumulation potential	:	None known if used/disposed of correctly
Environmental fate	:	None known if used/disposed of correctly

Section XII – Disposal Consideration

General consideration		Do not incinerate, or subject cells to temperatures in excess of 70ºC. Such abuse can result in loss of seal, leakage, and/or cell explosion. Dispose of in accordance with appropriate local regulations.

Section XIII – Transportation Information

Label for conveyance	:	For the single cell batteries and multi cell battery packs which are non-restricted to transport, use lithium batteries inside label. For the single cell batteries and multi cell battery packs which are restricted to transport (assigned to the Miscellaneous Class 9), use Class 9 Miscellaneous Dangerous Goods and UN Identification Number labels. In all cases, refer to the product transport certificate issued by the Manufacturer.
UN number	:	UN 38.03 (cells and batteries transported in bulk) UN 38.03 (cells and batteries transported in or with equipment)
Shipping name	:	Lithium ion batteries
Hazard classification	:	Depending on their lithium content or battery energy, some single cells and small multi cell battery packs with less than 100 Wh energy, may be non-assigned to Class 9 (Refer to Transport Certificate). For the single cell batteries and multi cell battery packs which are non-restricted to transport, use lithium ion batteries label for shipping.

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Section XIV – Regulatory Information

Regulations in general	:	ACGIH and OSHA: see exposure limits of the internal ingredients of the battery in section II and V. - IATA/ICAO (air transportation): UN 38.03 or UN 3481 - IMDG (sea transportation): UN 3803 or UN 3480 - Transportation within the US-DOT, 49 Code of Federal Regulations

Section XV – Other Information

Other information	:	This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein. This information relates to the specific materials designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his particular use. American Lithium Energy does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information. American Lithium Energy does not offer warranty against patent infringement.