







## Material/Product Safety Data Sheet (MSDS-PSDS)

<b>MP 176065 HD</b> <b>Integration™ product</b>	<b>Lithium-Ion single cells and multi-cell battery pack</b> <b>for power applications</b>
<b>Edition 1</b> <b>Date 02/2009</b>	

1. Identification of the Substance or Preparation and Company	
<b>Product</b>	Rechargeable lithium-ion single cells and multi-cell battery packs (Li-ion) for power applications
<b>Production sites</b>	Saft Rue Georges Leclanché - BP 1039 86060 Poitiers cedex 9 FRANCE +33 (0)5 49 55 48 48 +33 (0)5 49 55 48 50
<a href="http://www.saftbatteries.com">www.saftbatteries.com</a> (section "Contact")	
<b>Emergency contacts</b>	+1 (703) 527 3887 (CHEMTREC U.S. Service Center) within the USA : 800 424 9300

2. Composition and Information on Ingredients				
<p>Each cell consists of a hermetically sealed metallic container containing a number of chemicals and materials of construction of which the following could potentially be hazardous upon release.</p> <p>There is no potential for exposure to these ingredients unless the cell leaks, or opens, following high temperature, mechanical or electrical abuse.</p>				
Ingredient	Content* (wt. %)	CAS #	CHIP classification	
Lithium metal	0% <i>(in spite of their name, these batteries do not contain lithium metal)</i>			
LiNiCoAlO <sub>2</sub> <i>(Lithium Nickel Cobalt Aluminium Oxide)</i>	15-20%	207803-51-8		R43, R49, R53
Organic solvents	15-20 % Vinylidene Carbonate Ethylene Carbonate Propylene Carbonate Dimethyl Carbonate Lithium Hexafluorophosphate	872-36-6 96-49-1 108-32-7 616-38-6 21324-40-3	  	R11, R20, R21, R22, R34, R36, R37, R38, R41
Copper (Cu)	15-20 %	7440-50-8		
Aluminium (Al)	25-30 %	7429-50-5		
Graphite and Carbon	10-15 %	7782-42-5 1333-86-4		

\* Quantities may vary a little with cell model



3. Hazards Identification
<p>The rechargeable 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 and as long as their integrity is maintained.</p> <p>Do not short circuit, puncture, incinerate, crush, immerse in water, force discharge or expose to temperatures above the declared operating temperature range of the product. Risk of fire or explosion.</p> <p>Under normal conditions of use, the active materials and liquid electrolyte contained in the cells and batteries 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 container. Electrolyte leakage, electrode materials reaction with moisture/water or battery vent/explosion/fire may follow, depending upon the circumstances.</p>

4. First Aid Measures (in case of leaking or accidentally opened cells)	
<p>In case of accumulator breakage or burst, please evacuate employees from the contaminated area and ensure maximal ventilation in order to break-up corrosive gas, smoke and unpleasant odors.</p> <p>If it occurs, by accident, following measures must be taken:</p>	
<b>Inhalation</b>	<p>Not anticipated under normal use. Remove from exposure. Remove to fresh air and ventilate contaminated area. Rest and keep warm. If needed, give oxygen and breathing aid. Consult a doctor immediately.</p>
<b>Skin contact</b>	<p>Not anticipated under normal use. Remove immediately any contaminated or splash cloth and wash before reuse. Wash off skin thoroughly with cold water during more than 15 minutes. Consult a doctor.</p>
<b>Eye contact</b>	<p>Not anticipated under normal use. Wash immediately and thoroughly with water (eyelids lifted) during 15 to 30 minutes. Consult a doctor immediately.</p>
<b>Ingestion</b>	<p>Not anticipated under normal use. Wash out mouth thoroughly with water. If the patient is awake, let him drink copiously, preferably milk. Do not make the patient vomit. Hospitalize the patient for treatment.</p>

5. Fire Fighting Measures	
<b>Appropriate means of extinction</b>	<p>Dry chemical type or CO<sub>2</sub> extinguishers, Halon, or copious quantities of water or water-based foam can be used to cool down burning Li-ion cells and batteries. During water application, caution should be exercised as burning pieces of flammable particles may be ejected from the fire.</p>
<b>Specific protection equipment</b>	<p>In case of fire, use an autonomous respiratory device to avoid noxious or toxic smokes or fume inhalation. Wear protection clothes and equipment to avoid body contact with an electrolyte solution. Cool the accumulator outside if exposed to fire, to avoid its breaking.</p> <p>Evacuate all persons from immediate area of fire. Do not re-enter the area until it has been adequately purged of the fire vapour and extinguishing agent.</p>
<b>Particular hazards resulting from exposure to the substance/preparation, to combustion and gas products</b>	<p>The accumulator can spout vaporized or decomposed electrolyte fumes with fire when being heated over +100°C (+212°F) or disposed in fire. Solvents within the electrolyte are flammable liquids and must be kept away from any kind of ignition source.</p>







6. Accidental Release Measures	
<b>Individual precautions</b>	Evacuate the employees from the contaminated area until fumes dispersal. In case of electrolyte leakage from a cell or battery, do not inhale the gas as possible. In case of skin or eye contact, inhalation or ingestion, follow the measured described in section 4.
<b>Environmental precautions</b>	Avoid sewage, surface water and underground water contamination. Avoid ground and atmosphere contamination.
<b>Ways of cleaning</b>	Using protective glasses and gloves, use absorbent material (sand, earth or vermiculite) to absorb any exuded material. Seal leaking battery (unless hot) and contaminated absorbent material in plastic bag and dispose of as Special Waste in accordance with local regulations.

7. Handling and Storage	
The accumulator or batteries should not be opened, destroyed or incinerated since the accumulator may cause fire or the ingredients contained within could be harmful under some circumstances if exposed.	
<b>Handling</b>	Do not crush, pierce, short (+) and (-) battery terminals with conductive (i.e. metal) goods, which would end up into excessive heating. Do not directly heat or solder. Do not throw into fire. Do not mix batteries of different types and brands. Do not mix new and used batteries. Keep batteries in non conductive (i.e. plastic) trays. Do not disassemble, mutilate or mechanically abuse cells and batteries.
<b>Storage</b>	Store in a cool (preferably below 30°C), dry and ventilated area, away from moisture, sources of heat, open flames, food and drink. Keep adequate clearance between walls and batteries. Temperature above 70°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.
<b>Other</b>	Follow Manufacturers recommendations regarding maximum recommended currents, operating temperature range, maximum charge and discharge states. Applying pressure on deforming the battery may lead to disassembly followed by eye, skin and throat irritation. Do not immerse in water. The Li-ion cells and batteries are not designed to be recharged from external power sources besides specific Li-ion charger models approved by Saft. Connecting to inappropriate power supplies can result in fire or explosion.

8. Exposure Controls & Personal Protection		
Occupational exposure standard		
Ingredient	ACGIH (TLV)	OSHA (PEL)
LiNiCoAlO <sub>2</sub> (Lithium Nickel Cobalt Aluminium Oxide)	Nickel: TWA 0.05 mg/m <sup>3</sup> Cobalt: TWA 0.05 mg/m <sup>3</sup> Aluminum: 10 mg/m <sup>3</sup>	Nickel: TWA 1 mg/m <sup>3</sup> Cobalt: TWA 0.05 mg/m <sup>3</sup>
Organic solvents	None established	None established
Copper (Cu)	0.2 mg/m <sup>3</sup> as fume 1.0 mg/m <sup>3</sup> as dust and mist	0.1 mg/m <sup>3</sup> as fume 1.0 mg/m <sup>3</sup> as dust and mist
Aluminium (Al)	10.0 mg/m <sup>3</sup> , as dust	2.0 mg/m <sup>3</sup> , as soluble salt
Graphite and Carbon	3.5 mg/m <sup>3</sup> , TWA for carbon	2.0 mg/m <sup>3</sup> , as dust



	<b>Respiratory protection</b>	Not necessary under normal use. In case of incident or after an abusive use, in case of a cell opening or a leak, use a gas mask which covers the whole face and equipped with ABEK type.
	<b>Hand protection</b>	Not necessary under normal use. Use polypropylene, polyethylene, rubber or Viton gloves when handling leaking or ruptured cells.
	<b>Eye protection</b>	Not necessary under normal use. In case of incident or after an abusive use, in case of a leak or cell opening, wear safety glasses with protected side shields or a mask covering the whole face when handling leaking or ruptured cells
	<b>Other</b>	Not necessary under normal use. In the event of leakage or ruptured cells, wear chemical apron and protective clothes.

ACGIH : American Council of Governmental Industrial Hygienists  
 TLV : Threshold Limit Value is personal exposure limit, determined y ACGIH.

9. Physical and Chemical Properties	
Note: The following points are not applicable unless in case of leaking or damaged batteries with internal components sipping out.	
<b>Appearance</b>	Solid object with cylindrical or prismatic shape
<b>Odour</b>	Odourless (unless in case of damaged product with leaking electrolyte)
<b>pH</b>	Not applicable
<b>Flash point</b>	Not applicable
<b>Flammability</b>	Not applicable
<b>Relative density</b>	> 2 g/cm <sup>3</sup>
<b>Solubility (water)</b>	Not applicable, unless inner components are exposed
<b>Solubility (other)</b>	Not applicable

10. Stability and Reactivity	
The product is stable under conditions described in Section 7.	
<b>Conditions to avoid.</b>	Heating above 70°C or incinerate. Deformation. Mutilation. Crushing. Piercing. Disassembly. Short circuiting. Exposition over a long period to humid conditions.
<b>Materials to avoid</b>	Strong mineral acids, alkali solutions, strong oxidising materials and conductive materials
<b>Hazardous decomposition Products</b>	Lithium hexafluorophosphate may react with water in the atmosphere and produce toxic materials including fluorhydric acid. Thermal decomposition of the cells may produce of noxious or toxic fumes containing CO <sub>2</sub> , CO, H <sub>2</sub> , CH <sub>4</sub> , C <sub>2</sub> H <sub>4</sub> and C <sub>2</sub> H <sub>6</sub> . Thermal decomposition of the cell may produce release of electrolyte liquid and vapor, noxious materials dust and methane.

11. Toxicological Information	
<b>Signs &amp; symptoms</b>	None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes will be very irritating to skin, eyes and mucous membranes. Overexposure can cause symptoms of non-fibrotic lung injury and membrane irritation.
<b>Inhalation</b>	Contents of an opened cell can cause respiratory system and mucosa irritation. Overexposure to Lithium Nickel Dioxide may cause an allergic reaction. If gas is generated during cell assembly, throat irritation and nauseas may occur. Dimethyl carbonate (within the electrolyte) may be hazardous to loins. Lung irritant.



<b>Skin contact</b>	Electrolyte solution within the cells can cause a skin irritation in case of leak. Contact with Lithium Nickel Dioxide may cause allergic dermatitis.
<b>Eye contact</b>	Contents of an opened accumulator may cause eye irritation. Dust may cause inflammation of eyelids.
<b>Ingestion</b>	Electrolyte ingestion may cause damages to body tissues and to respiratory and digestive systems.
<b>Carcinogenic</b>	Nickel derivates are classified in suspected carcinogenetic list by the <i>National Toxicology Program</i> of the <i>US. Public Health Service</i> .
<b>Medical conditions generally aggravated by exposure</b>	In the event of exposure to internal contents, eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

<b>12. Ecological Information</b>	
<b>Mammalian effects</b>	None known if used/disposed of correctly.
<b>Eco-toxicity</b>	None known if used/disposed of correctly.
<b>Bioaccumulation potential</b>	None known if used/disposed of correctly.
<b>Environmental fate</b>	None known if used/disposed of correctly.

<b>13. Disposal Considerations</b>	
Do not incinerate, or subject cells to temperatures in excess of 70°C. Such abuse can result in loss of seal, leakage, and/or cell explosion. Dispose of or recycle in accordance with appropriate local regulations.	

<b>14. Transport Information</b>	
Note: when manufacturing a new battery pack, one must assure that it is tested in accordance with the UN Model Regulations, Manual of Tests and Criteria, Part III, subsection 38.3	
<b>Label for conveyance</b>	For the single cell batteries and multi-cell battery packs that are non-restricted to transport, use lithium-ion batteries inside label. For the single cell batteries and multicell 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.
<b>UN number</b>	UN 3480, for Li-ion batteries transported in bulk UN 3481, for Li-ion batteries contained in equipment or packed with it
<b>Shipping name</b>	Lithium-ion batteries
<b>Hazard classification</b>	Depending on their nominal energy, some single cells and small multi-cell battery packs may be non- assigned to Class 9 (Refer to Transport Certificate)
<b>Packing group</b>	II
<b>IMDG Code</b>	9033
<b>CAS</b>	
<b>EmS No.</b>	4.1-06
<b>Marine pollutant</b>	No
<b>ADR Class</b>	Class 9



#### 15. Regulatory Information

Regulations specifically applicable to the product:

- ACGIH and OSHA: see exposure limits of the internal ingredients of the battery in section 2.
- IATA/ICAO (air transportation): UN 3480 or UN 3481
- IMDG (sea transportation) : UN 3480 or UN 3481
- Transportation within the US-DOT, 49 Code of Federal Regulations

#### 16. 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, neither exhaustively nor perfect reliability can be granted. Information does not imply implicit or specific warranty of it.

This information relates to the specific products designated and may not be valid for such products 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.

Saft does not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information. Saft does not offer warranty against patent infringement.

**Edition 1 - February 2009**

Signature

A handwritten signature in blue ink, appearing to read 'N. Paquin', written over a horizontal line.

Nicolas Paquin  
Lithium Product Manager