VITZRO CELL

MATERIAL/PRODUCT SAFETY DATA SHEET

****Revision 1)**:
Revised on Jan 2 2009 following New IATA Regulation for Air shipment of Lithium battery

1. Identification of the Substance or Preparation and Company

1.1 Product : Lithium/Thionyl Chloride($Li/SOCl_2$) Cells & Batteries

1.2 Model : TEKCELL (Brand name)
Which is named as SB-AA02, SB-AA11, SB-A01, SB-C02, SB-D02, SW-AA11, SW-C01, SW-D02 and series of SB and SW.

1.3 Company
Name : Vitzrocell, Co. Ltd
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2. Composition & Information on Ingredients

Ingredient	Content (%)	CAS No.
Lithium(Li)	3.0 ~ 4.5%	7439-93-2
Carbon (C)	3.0 ~ 4.5%	1333-86-4
Electrolyte($SOCl_2$)	30 ~ 45%	7719-09-7
Aluminium Chloride($AlCl_3$)	2.0 ~ 4.0%	7446-70-0

3. Hazards Identification

The lithium thionyl chloride batteries described in this MSDS are hermetically sealed unit, which are not hazardous when used according to the recommendations of the manufacturer.
Under normal condition of use of the batteries, the electrode materials and the liquid electrolyte they contained are non-reactive provided the battery integrity is maintained. Risk of exposure exists only in case of mechanical, electrical or thermal abuse. Thus, the batteries should not short circuit, recharge, puncture, incinerate,

crush, immerse in water, force discharge, or expose to above the temperature range of the cell or battery. In these cases, there is risk of fire or explosion.

4. First Aid Measures

Handle according to emergency measures under in case of battery rupture, explosion or leakage and evacuate personnel from contaminated area and provide good ventilation to clear out corrosive fumes, gases or the pungent odour. Seek immediate medical attention.

Inhalation – Remove from exposure, rest and keep warm. In severe cases, obtain medical attention

Skin Contact – Wash off skin thoroughly with flow water for 10~15 minutes and obtain medical attention.

Eye Contact – Irrigate thoroughly with Water for at least 15 minutes and obtain medical attention.

Ingestion – Wash out mouth thoroughly with water and give plenty of water to drink for vomit and obtain medical attention.

5. Fire Fighting Measures

It is effective to use cold water in order to prevent spread of fire caused by lithium cells. However, never use hot water.

Lith-X(Class D extinguishing media) is the only effective on fires involving a few lithium batteries. If the cells are directly involved in a fire, DO NOT USE WATER, SAND, CO2, HALON and DRY POWDER or SODA ASH EXTINGUISHERS.

If a fire is in adjacent area, and cells are packed in their original containers, the fire can be fought based on fuelling material, e.g. paper and plastic products.

6. Accidental Release Measures

Do not breathe vapours or touch liquid with bare hand. If the skin has come into contact with the electrolyte, take an action in accordance with 4. First Aid Measures.

Graphite powder should be used to absorb the exudation, seal leaking battery and graphite powder in plastic bag and dispose of Special Waste.

7. Handling and Storage

Handling – Prevent short circuit and do not use the battery above the temperature rating of battery. Do not recharge, force over-discharge (voltage below 0.0V), puncture and compress.

Storage – Storage preferably in cool (below 30°C) and non- elevated temperatures place. Storage in high temperatures can result in shortened battery life and degrade performance. Do not store batteries in high humidity, shock and vibration environments.

Others – Do not charge Li/$SOCl_2$ primary battery which is not chargeable battery. Follow manufacturer's recommendations regarding maximum recommended current and operating temperature range.

8. Exposure Controls & Personal Protection

The following safety measures are not necessary in normal use.
They need only be applied if there is a risk that, in use or handling, the recommendations, as outlined in Section 3, have not been followed.

Respiratory protection – In all fire situations, use filter mask or self- contained breathing Apparatus for harmful gases or other material prevention.

Hand protection – In leakage situations, use specific gloves for leaking chemical substance and heat prevention.

Eye protection – Use safety goggles or face shield which can separate eyes and the outside for chemical substance and heat prevention.

Other protective equipment – Additional equipments are needed to prevent from chemical substance, harmful material and heat. (Clothes, boots etc.)

9. Physical and Chemical Properties

Appearance	Cylindrical shape
Odour	Odourless. If leaking, gives off a pungent and corrosive odour.
pH	Not applicable (Unless individual components exposed)
Boiling point	Not applicable (Unless individual components exposed)

Vapour pressure (mmHg, 25ºC)	Not applicable (Unless individual components exposed)
Relative density	Not applicable (Unless individual components exposed)
Flash point	Not applicable (Unless individual components exposed)
Flammability	Not applicable (Unless individual components exposed)
Solubility (water)	Not applicable (Unless individual components exposed)
Solubility (other)	Not applicable (Unless individual components exposed)
Physical state	Solid

10. Stability and Reactivity

Product is stable under conditions described in Section 7 (Handling and storage).

Conditions to avoid – heating and incineration above 90℃, transformation, abscission, compression, puncture, disassembly, charge, a short circuit, storage in high humidity for a long time.

Material to avoid – Prevent to contact Oxidizer, Strong carbonated water, Alkali solutions, Water (H_2O), Aluminium, Zinc, and Electrolyte.

Harmful materials caused by disassembly

1. Water (H_2O) reacts with lithium metal to form powder such as lithium hydroxide (LiOH), lithium oxide and hydrogen gas (H_2)

2. In case of heating Thionyl chloride($SOCl_2$) above 150℃, chlorine(Cl_2), sulfur dioxide(SO_2), sulphur trioxide(SO_3), disulfur dichloride(S_2Cl_2), sulphur dichloride (SCl_2), lithium oxide(Li_2O) may occur.

3. Water (H_2O) reacts with thionyl chloride($SOCl_2$) in room temperature to form hydrochloric acid(HCl) and sulphur dioxide(SO_2).

11. TOXICOLOGICAL INFORMATION

Symptoms and Signs – None, unless battery ruptures. In the event of exposure to internal contents, corrosive fumes will be very irritating to skin, eyes and mucous membranes.

Inhalation – Lung irritant.

Skin contact – Skin irritant

Eye contact – Eye irritant

Ingestion – if swallow, it can be poisoned.

Medical condition aggravated by exposure – In the event of exposure to internal contents, eczema, skin allergies, lung injuries, asthma and other respiratory disorders may occur.

12. Ecological Information

When properly used of disposed the battery does not present environmental hazard.

Cells of Vitzrocell do not contain mercury, cadmium, lead and Cr^{6+} which has a bad influence on environment.

13. Disposal Considerations

Do not incinerate or subject cells to temperatures in excess of 85°C. In the event of such abuse can result in loss of seal that causes explosion.

Cells should be separated after use in order to prevent short circuit terminal by using tape or other tools and dispose of in accordance with regulations.

14. Transportation

Lithium cells and batteries are classified as UN 3090. Dependent on the lithium content, cells (less than 1g) or batteries (less than 2g) can be transported under the requirements of special provision 188/A45. Lithium cell must pass relevant examination regardless of lithium content. Vitzrocell's cells and batteries successfully passed the tests of UN Manual of Tests and Criteria. Relevant regulation and examination regulation for product are as follows.

- The UN Recommendations on the Transport of Dangerous Goods, Model Regulations
- The UN recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, Section 38.3

Hazard Classification: Class9

UN Number: 3090 Lithium batteries

Packing group: II

Ref)

The batteries are complied with the PACKING INSTRUCTION OF the current IATA dg regulations (PI968).

This instruction applies to lithium metal or lithium alloy cells and batteries (UN 3090) on passenger and Cargo Aircraft Only.

Part 1

Lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Regulations if they meet the requirements in Part 1.

Lithium batteries identified by the manufacturer as being defective for safety reasons, that have been damaged or have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet the following:

1. a lithium metal cell, the lithium content is not more than 1 g;
2. a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g;
3. each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.

Quantity per package Passenger aircraft		Quantity per package Cargo Aircraft Only
Lithium metal cells and batteries	2.5 kg G	2.5 kg G

General requirements

Cells and batteries must be packed in strong outer packagings that conform to 5.0.2.4, 5.0.2.6.1 and 5.2.12.1.

Additional requirements

Cells and batteries must be packed in inner packagings that completely enclose the cell or battery.

Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.

Each package must be capable of withstanding a 1.2 m drop test in any orientation without:

- damage to cells or batteries contained therein;
- shifting of the contents so as to allow battery to battery (or cell to cell) contact;
- release of contents.

Each consignment must be accompanied with a document such as an air waybill with an indication that:

- the package contains lithium metal cells or batteries;
- the package must be handled with care and that a flammability hazard exists if the package is damaged;
- special procedures should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
- a telephone number for additional information.

Each package must be labeled with a lithium battery handling label (Figure 7.4.I);

Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

OUTER PACKAGINGS Type	Drums	Jerricans	Boxes

Part 2

Part 2 requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

1. Be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, subsection 38.3.
2. Incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport, and be equipped with an effective means of preventing external short circuits.

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

Cells with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride, which have been discharged to the extent that the open circuit voltage is less than the lower of:

• 2 volts; or

• two-thirds of the voltage of the undischarged cell;

and batteries containing one or more such cells, are forbidden for transport. Quantity per package Passenger aircraft	Quantity per package Cargo Aircraft Only	
Lithium metal cells and batteries	2.5 kg G	35 kg G

General requirements

The General Packing Requirements of 5.0.2 must be met.

Additional requirements

• all lithium metal cells and batteries prepared for transport as Class 9 must be protected against short circuits;

• packagings must meet Packing Group II performance standards;

• lithium batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings and protective enclosures not subject to the requirements of Section 6 of these Regulations, if approved by the appropriate national authority of the State of origin. A copy of the document of approval must accompany the consignment.

Lithium metal cells and batteries prepared for transport on Passenger Aircraft as Class 9:

• must be packed in either a rigid metal intermediate or a metal outer packaging;

• cells and batteries must be surrounded by cushioning material that is non-combustible and non-conductive before being placed in either the metal intermediate or metal outer packaging.

OUTER PACKAGINGS

Type				Drums				Jerricans					Boxes			
Desc	Steel	Alum-inium	Ply-wood	Fibre	Plastic	Other metal	Steel	Alum-inium	Plastic	Steel	Alum-inium	Wood	Ply-wood	Recon-stituted wood	Fibre-board	Plastic
Spec	1A2	1B2	1D	1G	1H2	1N2	3A2	3B2	3H2	4A	4B	4C1 4C2	4D	4F	4G	4H1 4H2

Other regulation and guideline

ADR, RID 188, 230, 310, P903

IATA A45, A88, A99

IMDG code 188, 230, 310, P903

15. Regulatory Information

None

16. Other Information

TEKCELL (manufacturer: Vitzrocell) was recognized safety by UL (Underwriters Laboratories) located in Northbrook, U.S.A. (UL File No. : MH 18384)

Emergency contact phone No.: +82 2 2024 3220

Vitzrocell has all authorities about this MSDS. In case of use of relevant data by outside presentation, should get permission by Vitzrocell.