1. Chemical Product and Company Identification

Product Identification
ICR18650 Lithium-Ion Battery
(All models manufactured by LG Chem.)

Manufacturer
LG Chemical Limited
Twin Tower
Yoido-Dong, Youngdeungpo-Ku
Seoul, Korea

Emergency Telephone Number
82-2-3773-7256

2. Composition Information

<table>
<thead>
<tr>
<th>Hazardous Ingredients</th>
<th>%</th>
<th>CAS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum Foil</td>
<td>2-10</td>
<td>7429-90-5</td>
</tr>
<tr>
<td>Nickel compound (proprietary)</td>
<td>0-25</td>
<td></td>
</tr>
<tr>
<td>Manganese compound (proprietary)</td>
<td>0-15</td>
<td></td>
</tr>
<tr>
<td>Cobalt compound (proprietary)</td>
<td>4-50</td>
<td></td>
</tr>
<tr>
<td>Styrene-Butadiene-Rubber</td>
<td>&lt;1</td>
<td></td>
</tr>
<tr>
<td>Polyvinylidene Fluoride (PVDF)</td>
<td>&lt;5</td>
<td>24937-79-9</td>
</tr>
<tr>
<td>Copper Foil</td>
<td>2-10</td>
<td>7440-50-8</td>
</tr>
<tr>
<td>Carbon (proprietary)</td>
<td>10-30</td>
<td>7440-44-0</td>
</tr>
<tr>
<td>Electrolyte (proprietary)</td>
<td>10-20</td>
<td></td>
</tr>
<tr>
<td>Stainless steel, Nickel and inert materials</td>
<td>Remainder</td>
<td>N/A</td>
</tr>
</tbody>
</table>
UN CLASS

1. Even classified as lithium batteries (UN3480), 2015 IATA Dangerous Goods Regulations 56th edition Packing Instruction 965 is applied. The product is handled as Non-Dangerous Goods by meeting the following requirements.

- Lithium ion cells and batteries offered for transport are not subject to other additional requirements of the UN Regulations if they meet the following.
  - For cells, the Watt-hour rating is not more than 20Wh
  - For batteries, Watt-hour rating is not more than 100Wh

The Watt-hour rating must be marked on outside of the battery case except those manufactured before 1 January, 2009 which may be transported without this marking until 31 December 2012.

- 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 (subsection 38.3)

2. Even classified as lithium batteries packed with equipment (UN3481), 2015 IATA Dangerous Goods Regulations 56th edition Packing Instruction 966 section II is applied. The product is handled as Non-Dangerous Goods by meeting the following requirements.

- Lithium ion cells and batteries offered for transport are not subject to other additional requirements of the UN Regulations if they meet the following.
  - For cells, the Watt-hour rating is not more than 20Wh
  - For batteries, Watt-hour rating is not more than 100Wh

The Watt-hour rating must be marked on outside of the battery case except those manufactured before 1 January, 2009 which may be transported without this marking until 31 December 2012.

- 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 (subsection 38.3)

- Maximum quantity: Minimum needed for the operation of the equipment, plus 2 spares.

And they are out of scope for Special Provision A154 and comply with Special Provision A164.

Jin Soo Park
Vice chairman & CEO
LG Chem, Ltd.
123, Yeoi-daero, Yeongdeungpo-gu, Seoul 150-729, Korea
3. Battery Pack
- Transport of dangerous goods, Special Provision 188.
  Recommendations on the transport dangerous goods-Model regulations 15th
  revised edition, IATA Special Provision A154, A164 and IMDG Special Provision
  188.
  This product passed 1.2M drop test and comply with UN38.3.

3. Hazards Identification

Emergency Overview
May explode in a fire, which could release hydrogen fluoride gas.
Use extinguishing media suitable for materials burning in fire.

Primary routes of entry

- Skin contact : NO
- Skin absorption : NO
- Eye contact : NO
- Inhalation : NO
- Ingestion : NO

Symptoms of exposure

Skin contact
No effect under routine handling and use.

Skin absorption
No effect under routine handling and use.

Eye contact
No effect under routine handling and use.

Inhalation
No effect under routine handling and use.
Reported as carcinogen
Not applicable

4. First Aid Measures

**Inhalation**
Not a health hazard.

**Eye contact**
Not a health hazard.

**Skin contact**
Not a health hazard.

**Ingestion**
If swallowed, obtain medical attention immediately.

**IF EXPOSURE TO INTERNAL MATERIALS WITHIN CELL DUE TO DAMAGED OUTER CASING, THE FOLLOWING ACTIONS ARE RECOMMENDED:**

**Inhalation**
Leave area immediately and seek medical attention.

**Eye contact**
Rinse eyes with water for 15 minutes and seek medical attention.

**Skin contact**
Wash area thoroughly with soap and water and seek medical attention.

**Ingestion**
Drink milk/water and induce vomiting; seek medical attention.
5. Fire Fighting Measures

General Hazard
Cell is not flammable but internal organic material will burn if the cell is incinerated. Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

Extinguishing Media
Use extinguishing media suitable for the materials that are burning.

Special Firefighting Instructions
If possible, remove cell(s) from fire fighting area. If heated above 125°C, cell(s) may explode/vent.

Firefighting Equipment
Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

6. Accidental Release Measures

On Land
Place material into suitable containers and call local fire/police department.

In Water
If possible, remove from water and call local fire/police department.

7. Handling and Storage

Handling
No special protective clothing required for handling individual cells.

Storage
Store in a cool, dry place.
8. Exposure Controls / Personal Protection

**Engineering controls**
Keep away from heat and open flame. Store in a cool dry place.

**Personal Protection**

**Respirator**
Not required during normal operations. SCBA required in the event of a fire.

**Eye/face protection**
Not required beyond safety practices of employer.

**Gloves**
Not required for handling of cells.

**Foot protection**
Steel toed shoes recommended for large container handling.

9. Physical and Chemical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Solid</td>
</tr>
<tr>
<td>Odor</td>
<td>N/A</td>
</tr>
<tr>
<td>pH</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>N/A</td>
</tr>
<tr>
<td>Vapor density</td>
<td>N/A</td>
</tr>
<tr>
<td>Boiling point</td>
<td>N/A</td>
</tr>
<tr>
<td>Solubility in water</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>N/A</td>
</tr>
<tr>
<td>Density</td>
<td>N/A</td>
</tr>
</tbody>
</table>
10. Stability and Reactivity

Reactivity
None

Incompatibilities
None during normal operation. Avoid exposure to heat, open flame, and corrosives.

Hazardous Decomposition Products
None during normal operating conditions. If cells are opened, hydrogen fluoride and carbon monoxide may be released.

Conditions To Avoid
Avoid exposure to heat and open flame. Do not puncture, crush or incinerate.

11. Toxicological Information

This product does not elicit toxicological properties during routine handling and use.

<table>
<thead>
<tr>
<th>Sensitization</th>
<th>Teratogenicity</th>
<th>Reproductive toxicity</th>
<th>Acute toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

If the cells are opened through misuse or damage, discard immediately. Internal components of cell are irritants and sensitizers.

12. Ecological Information

Some materials within the cell are bioaccumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment.
13. Disposal Considerations

California regulated debris

RCRA Waste Code : Nonregulated

Dispose of according to all federal, state, and local regulations.

14. Transport Information

Lithium Ion batteries are considered to be "Rechargeable batteries" and meet the requirements of transportation by the U.S. Department of Transportation (DOT), the International Civil Aviation Administration (ICAO), the International Maritime Dangerous Goods (IMDG) Code.

Even classified as lithium ion batteries (UN3480), 2015 IATA Dangerous Goods Regulations 56th edition Packing Instruction 965 Section IB or II is applied.

The general and additional requirements apply to all lithium ion cells and batteries prepared for transport according to this packing instruction:

1) Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section IB, Table 965-IB; and

<table>
<thead>
<tr>
<th>Outer Packaging</th>
<th>Net Quantity per Package</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Passenger Aircraft</td>
</tr>
<tr>
<td>Lithium Ion Cells and Batteries</td>
<td>10 kg</td>
</tr>
</tbody>
</table>

2) Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.
TABLE 965-II

<table>
<thead>
<tr>
<th>Contents</th>
<th>Lithium ion cells and/or batteries with a Watt-hour rating of 2.7 Wh or less</th>
<th>Lithium ion cells with a Watt-hour rating of more than 2.7 Wh but not more than 20 Wh</th>
<th>Lithium ion batteries with a Watt-hour rating of more than 20 Wh but not more than 100 Wh</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Maximum number of cells/batteries per package</td>
<td>No limit</td>
<td>8 cells</td>
<td>2 Batteries</td>
</tr>
<tr>
<td>Maximum net quantity per package</td>
<td>2.5 kg</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Cells and/or batteries specified in columns 2, 3 and 4 of Table 965-II must not be combined in the same package.

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 3 subsection 38.3.

The product has been evaluated according to the UN Manual of Tests and Criteria.

<table>
<thead>
<tr>
<th>No.</th>
<th>Test Item</th>
<th>Criteria</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>Altitude simulation</td>
<td>- No leakage, venting, disassembly, rupture and no fire.</td>
<td>Pass</td>
</tr>
<tr>
<td>Test 2</td>
<td>Thermal test</td>
<td>- Measuring mass before/after each test. (If $M &gt; 5, \text{g}$, less than 0.1%)</td>
<td>Pass</td>
</tr>
<tr>
<td>Test 3</td>
<td>Vibration</td>
<td>- Measuring voltage before/after each test. (more than 90%)</td>
<td>Pass</td>
</tr>
<tr>
<td>Test 4</td>
<td>Shock</td>
<td>- No disassembly, rupture and fire within six hours of this test.</td>
<td>Pass</td>
</tr>
<tr>
<td>Test 5</td>
<td>External circuit short</td>
<td>- Max. temperature should not exceed 170°C.</td>
<td>Pass</td>
</tr>
<tr>
<td>Test 6</td>
<td>Impact</td>
<td>- No disassembly and fire within seven days of the test.</td>
<td>Pass</td>
</tr>
</tbody>
</table>

15. Regulatory Information

OSHA hazard communication standard (29 CFR 1910.1200)

- Hazardous
- Non-hazardous

16. Other Information

Jin Soo Park  
Vice chairman&CEO  
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The data in this Product Safety Data Sheet relates only to the specific product
designated herein and does not relate to use in combination with any other product or
in any process. This PSDS may not meet regulatory requirements in other countries.
This information is based on technical information believed to be reliable. It is subject
to revision as additional knowledge and experiences are gained.

REFERENCE

International Chemical Safety Cards(ICSCs) International Occupational Safety and Health
Information Centre(CIS) 0710 March 1999

Opinion of the scientific committee on toxicity, ecotoxicity and the
environment(CSTEE)
Adopted by the CSTEE during the 43rd plenary meeting of 28 May 2004

UN-Recommendations on the Transport of Dangerous Goods Model Regulations.
(ST/SG/AC.10/11/Rev.5/Amend.2)

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