

The smallest working unit in a battery is the electrochemical cell, consisting of a cathode and an anode separated and connected by an electrolyte. The electrolyte conducts ions but is an insulator to electrons. In a charged state, the anode contains a high concentration of intercalated lithium while the cathode is depleted of lithium. During the discharge, a lithium ion leaves the anode and migrates through the electrolyte to the cathode while its associated electron is collected by the current collector to be used to power an electric device.

The cell designs and combinations in modules and packs differ greatly. (...) The electrodes in lithium-ion cells are always solid materials. One can distinguish between cell types according to their electrolytes, which may be liquid, gel, or solid-state components. The electrolytes in gel and solid-state cells represent a structural component and do not need additional separators for the effective separation of electrodes and avoidance of short circuits. Cells come in button, cylindrical, and prismatic forms.

For low-energy and low-power applications, a cell often represents a full battery. For high-energy and high-power applications such as transportation or stationary storage, a number of cells are packaged in a module, and a number of modules are packaged in a battery.

I-Reading comprehension

Say if the following statements about the above text are true or false and justify your answer in both cases.

- ✓ 1. The cathode is full up with lithium during the battery discharge.
- ✓ 2. Whether they're in liquid, gel or solid state, cells can be classified according to their electrolytes.
- ✗ 3. Short circuits can be avoided in electrolytes in gel and solid states cells thanks to additional separators.
- ✓ 4. A module is defined as a space where cells are packaged.
- ✓ 5. The lithium ion electron is used to power an electric device.

II- Grammar:

A- Put the following sentences into the passive:

1. How much will they pay you?
- / 2. They didn't give me the information I needed.
3. Has anybody shown you what to do?
4. Some scientists believe that cloning experiments _____ (should not / to permit).
5. Within five years, sensor computers _____ (could/to shrink) to the size of a grain of sand.

B- Complete the following sentences with the right connector or preposition:

1. I won't invite my classmates to a party I know them well.
a-while b- if c-until
2. I don't remember about the accident.
a-anything b-nothing c-something
3. The meeting will be from 4.00 till 6.00. Oh, that new Italian film is on at 8.00.
a-Still b-by the way c-as a matter of fact
4. I'm going away the end of the month.
a-in b-on c-at
5. Goodbye! I'll see you Sunday morning.
a-in b-on c-at

C- Fill in the gaps with the following terms: *Raw materials / The consumption / Viscous / Lehr / Melted / The molten glass / Fluid / Molten Tin / Weighed / A furnace.*

The *raw materials* (silica sand, calcium, oxide, soda and magnesium) are properly *melted* and mixed and then introduced into *furnace* where they are *fluid* at 1500° C. The use of cullet reduces *consumption* of natural gas while melt colorants are added to produce tinting and solar-radiation absorption properties.

The molten glass then flows from the glass furnace into a bath of *molten tin* in a continuous ribbon. The glass, which is highly *viscous*, and the tin, which is very *fluid*, do not mix and the contact surface between these two materials is perfectly flat. After that, metal oxides are directly applied to the glass, while the glass is still hot, in the annealing

III- Written expression:

Relying on your previous background, describe in 150 words how battery is made and its manufacturing process.

The smallest working unit in a battery is the electrochemical cell, consisting of a cathode and an anode separated and connected by an electrolyte. The electrolyte conducts ions but is an insulator to electrons. In a charged state, the anode contains a high concentration of intercalated lithium while the cathode is depleted of lithium. During the discharge, a lithium ion leaves the anode and migrates through the electrolyte to the cathode while its associated electron is collected by the current collector to be used to power an electric device.

The cell designs and combinations in modules and packs differ greatly. (...) The electrodes in lithium-ion cells are always solid materials. One can distinguish between cell types according to their electrolytes, which may be liquid, gel, or solid-state components. The electrolytes in gel and solid-state cells represent a structural component and do not need additional separators for the effective separation of electrodes and avoidance of short circuits. Cells come in button, cylindrical, and prismatic forms.

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I-Reading comprehension

Say if the following statements about the above text are true or false and justify your answer in both cases.

1. The cathode is full up with lithium during the battery discharge.
2. Whether they're in liquid, gel or solid state, cells can be classified according to their electrolytes.
3. Short circuits can be avoided in electrolytes in gel and solid states cells thanks to additional separators.
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For low-energy and low-power applications, a cell often represents a full battery. For high-energy and high-power applications such as transportation or stationary storage, a number of cells are packaged in a module, and a number of modules are packaged in a battery.

I-Reading comprehension 5.P

Say if the following statements about the above text are true or false and justify your answer in both cases.

1. The cathode is full up with lithium during the battery discharge. **True**
2. Whether they're in liquid, gel or solid state, cells can be classified according to their electrolytes. **True**
3. Short circuits can be avoided in electrolytes in gel and solid states cells thanks to additional separators. **False**
4. A module is defined as a space where cells are packaged. **True**
5. The lithium **ion** is used to power an electric device. **False**

II- Grammar:

B- Put the following sentences into the passive: 2.5.P

1. How much **will you be paid**?
2. **The information I needed wasn't given to me / I wasn't given the information I needed.**
3. **Have you been shown what to do?**
4. Some scientists believe that cloning experiments **should not be permitted.**
5. Within five years, sensor computers **could be shrunk** to the size of a grain of sand.

D- Complete the following sentences with the right connector or preposition: 2.5.P

- 1) I won't invite my classmates to a party **until** I know them well.
 - a. a-while
 - b- if
 - c-until
- 2) I don't remember **anything** about the accident.
 - a. a-anything
 - b-nothing
 - c-something
- 3) The meeting will be from 4.00 till 6.00. Oh, **by the way** that new Italian film is on at 8.00.
 - a. a-Still
 - b-by the way
 - c-as a matter of fact
- 4) I'm going away **at** the end of the month.
 - a. a-in
 - b-on
 - c-at
- 5) Goodbye! I'll see you **on** Sunday morning.
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 - b-on
 - c-at

E- Fill in the gaps with the following terms: *Raw materials / The consumption / Viscous / Lehr / Melted / The molten glass / Fluid / Molten Tin / Weighed / A furnace.*5.P

The **raw materials** (silica sand, calcium, oxide, soda and magnesium) are properly **weighed** and mixed and then introduced into a **furnace** where they are **melted** at 1500° C. The use of cullet reduces **the consumption** of natural gas while melt colorants are added to produce tinting and solar-radiation absorption properties.

The molten glass then flows from the glass furnace into a bath of **molten tin** in a continuous ribbon. The glass, which is highly **viscous**, and the tin, which is very **fluid**, do not mix and the contact surface between these two materials is perfectly flat. After that, metal oxides are directly applied to the glass, while the glass is still hot, in the annealing **lehr**.

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