

Task 1. Match each term with the correct function (A, B, C, etc.).

Term	Function (A, B, or C)
1. Anode	a) Materials that permit electric current to flow freely through them.
2. Cathode	b) The electrode where electrical current exits, usually negative.
3. Separator Sheet	c) A small opening that allows excess pressure or heat to escape from inside a device to prevent dangerous conditions.
4. Conductors	d) The part of an electrical device where current flows into the device from the external circuit.
5. Insulators	e) Prevents components from touching while allowing the flow of ions to maintain current.
6. Vent Hole	f) The material that allows electrical current to flow through it.

Task 2. Read each situation carefully and choose the term that best fits the description from the task 1.**1. Situation 1:**

In a battery, this component allows the flow of ions between the two electrodes while preventing the electrodes from touching each other, which could cause a short circuit. It's a key part of ensuring the battery functions properly.

Which term is being described? _____

2. Situation 2:

In a fuel cell, this electrode receives electrons and reacts with oxygen from the air to produce energy. It's essential for the generation of electricity in the system.

Which term is being described? _____

3. Situation 3:

When you want to keep electrical current confined to a specific area, materials like rubber or glass are often used around wires and electrical components. These materials help prevent unwanted flow of electricity.

Which term is being described? _____

4. Situation 4:

In the design of electronic circuits, this material is used to create paths that allow electricity to flow from one component to another. It's usually a metal, like copper, that has low resistance to the flow of current.

Which term is being described? _____

5. Situation 5:

This part of a battery helps to prevent the buildup of pressure or gases that could damage the battery or cause an explosion. It allows the release of any excess pressure within the system.

Which term is being described? _____

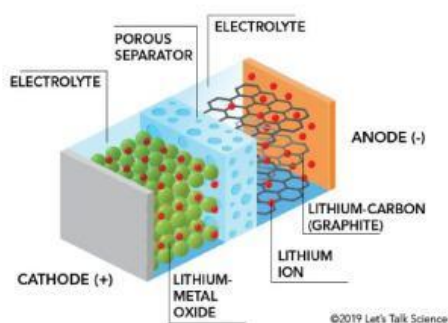
6. Situation 6:

In a rechargeable battery, this is where the electrical energy is stored during charging. During discharging, it releases the stored energy in the form of electrons.

Which term is being described? _____

READ THE TEXT

PARTS OF A LITHIUM-ION BATTERY



Lithium-ion batteries (LiBs) are widely used for energy storage because they can store a lot of energy and last a long time. However, these batteries need careful handling as they can fail or become dangerous if used incorrectly. A key part of keeping LiBs safe is the separator, a thin membrane placed between the anode and cathode. The separator stops electrical short circuits while allowing ions to move, which is essential for the battery to work.

The separator is usually made from a special polymer material that is strong and stable. It must handle tough battery conditions and withstand high tension during assembly. The separator's design affects the battery's performance, energy output, lifespan, and safety. Additionally, the separator acts as an **insulator**, preventing direct contact between the anode and cathode while allowing ion flow.

One major concern with LiBs is thermal runaway, where the battery gets too hot and may catch fire or explode. This can happen due to overcharging, over-discharging, or internal short circuits. To prevent this, LiBs have safety features like vents, circuit breakers, fuses, and PTC devices. **Vent holes** in the battery casing release pressure buildup, reducing the risk of catastrophic failure during overheating.

PTC devices are special components that increase resistance as the temperature rises, limiting current flow and preventing further heating. Vents help release pressure if it builds up inside the battery, avoiding dangerous failures. The electrolyte inside the battery serves as a **conductor**, enabling ions to move between the anode and cathode, which is crucial for energy transfer.

The materials in the anode, cathode, and electrolyte also affect safety. Scientists are constantly working to improve these materials to make LiBs safer and more reliable.

Task 3. Identify synonyms for the given words within the text provided.

- Negative electrode _____
- Electrical faults _____
- Uncontrolled heat escalation _____
- Excessive charging _____
- Current carrier _____
- Positive electrode _____

Task 4. Fill in the gaps with the correct collocation.

- Energy storage
- Long lifespan
- Electrical short circuits
- Ionic charge carriers
- Polymer material

- Tough conditions
- High tension
- Battery performance
- Energy output
- Thermal runaway

1. _____ in batteries must be prevented to avoid overheating and potential explosions.
2. _____ is critical for renewable energy systems, ensuring electricity is available even when production is low.
3. Engineers constantly test _____ to optimize energy storage and safety features.
4. The separator in a battery is made from _____ to ensure to ensure durability and safety.
5. Lithium-ion batteries are preferred because of their _____ and high energy efficiency.
6. _____ can damage devices and pose safety risks if not properly managed.
7. _____ in electrical wires requires specialized handling during construction for safety.
8. Power lines are designed to endure _____, such as storms and extreme temperatures.
9. The _____ of a battery is measured to determine its suitability for high-power applications.
10. _____ enable the flow of electricity within a battery, ensuring consistent energy output.

Task 5. Choose the correct answer to the questions.

1. Why are lithium-ion batteries (LiBs) widely used?
 - A. They are inexpensive and easy to handle.
 - B. They can store a lot of energy and last a long time.
 - C. They work only at low temperatures.
2. What is the primary function of the separator in LiBs?
 - A. To connect the anode and cathode.
 - B. To stop short circuits while allowing ions to flow.
 - C. To increase the battery's temperature.

3. What is the separator usually made from?
 - A. Metal alloy.
 - B. Glass fiber.
 - C. A special polymer material.
4. What does the separator's design influence?
 - A. The energy output, lifespan, and safety.
 - B. The battery's color and size.
 - C. The type of charger used.
5. What is thermal runaway?
 - A. The separator breaking apart.
 - B. A battery overheating uncontrollably.
 - C. An increase in battery size due to charging.

Task 6. Read the statements and decide if they are TRUE or FALSE.

1. _____ The anode in an electrical circuit is the point where current flows into a device.
2. _____ The cathode is the part of the circuit where current flows out of a device.
3. _____ A separator sheet in a circuit helps to separate different electrical components to avoid short circuits.
4. _____ Conductors are materials that allow electricity to pass through them easily, such as copper or aluminum.
5. _____ Insulators are materials that allow electricity to pass freely and are often used to coat wires.
6. _____ Vent holes in electrical equipment are used to release pressure that could build up due to excessive heating.
7. _____ A conductor in a circuit can be made of materials like rubber or plastic, which easily allow electrical current to flow.
8. _____ An insulator in an electrical system is used to protect people from electrical shock and to prevent short circuits.
9. _____ A cathode and anode are used to describe the flow of electrons in all types of electrical devices, including circuits and batteries.
10. _____ A separator sheet in a circuit is usually made from conductive materials to help direct the flow of electricity.

Task 7. Imagine you are designing a battery. You need to explain how the different components contribute to the battery's performance and safety. Choose the correct answer for each gap.

Lithium-ion batteries (LiBs) are widely used for energy storage because they can store a lot of energy and last a long time. However, these batteries need careful handling as they can fail or become dangerous if used incorrectly. A key part of keeping LiBs safe is the (1) _____, a thin membrane placed between the (2) _____ and (3) _____. The (4) _____ stop electrical short circuits while allowing ions to move, which is essential for the battery to work.

The (5) _____ are materials that prevent the flow of electrical charge, ensuring safety by preventing the flow of current to unwanted parts of the battery. If the battery gets too hot, the (6) _____ in the battery helps to release the pressure, preventing dangerous failure or even explosions.

Options:

- | | |
|-------------------|---------------------|
| 1. (A) Anode | (B) Separator Sheet |
| 2. (A) Cathode | (B) Anode |
| 3. (A) Cathode | (B) Anode |
| 4. (A) Insulators | (B) Separator Sheet |
| 5. (A) Conductors | (B) Insulators |
| 6. (A) Vent Hole | (B) Anode |