Chapter – 12

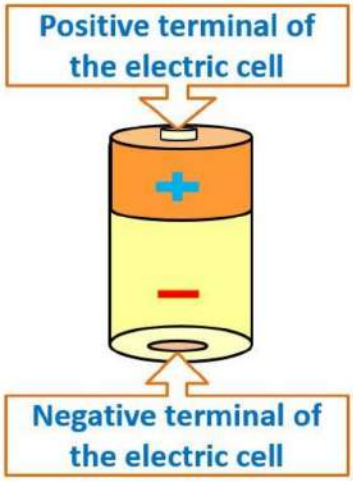
Electricity and Circuits

Electric Cell

Electric Cell: An electric cell is a device which produces electricity from the chemicals stored inside it. When the chemicals inside the electric cell are used up, the electric cell stops producing electricity. Then the electric cell has to be replaced with a new one.

Structure: An electric cell consists of a metal cap and metal disc at the end of the cell. A metal cap is the positive terminal of an electric cell and a metal disc is a negative terminal.

Uses: The devices like Alarm clocks, wrist watches, transistor radios, cameras and many other devices use electric cells. Electricity to the bulb in a torch is provided by the electric cell.

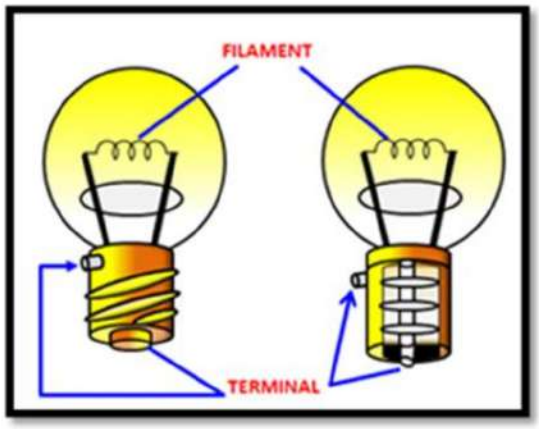


Tip: Never join the terminals of the electric cell because in this case electric cell get used up very fast and the cell stop working.

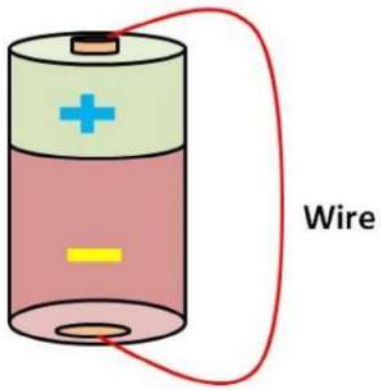
A Bulb Connected to an Electric Cell

Parts of a Bulb:

- **Glass case:** It is the outer covering of glass in a bulb which prevents oxygen in the air from reaching the hot filament.
- **Filament**: The filament of the bulb is made up of metallic thin wire (tungsten filament) that gives off light.
- **Terminal**: Every bulb has two terminals one is connected with the negative terminal of the cell and another is connected with the positive terminal of the cell.

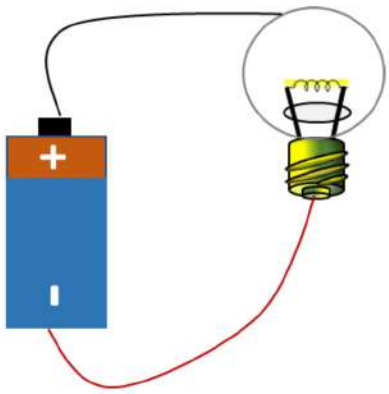


Example: What happens if we join two terminals of the electric cell each other as shown in the following figure.



Solution: When we join the two terminals of the electric cell without connecting them through a switch and a device like a bulb, then the maximum possible current flows through the circuit. Because of this, the chemical energy stored in the cell gets used up very fast which gets converted to electricity. This results in the capacity of the cell getting quickly diminished.

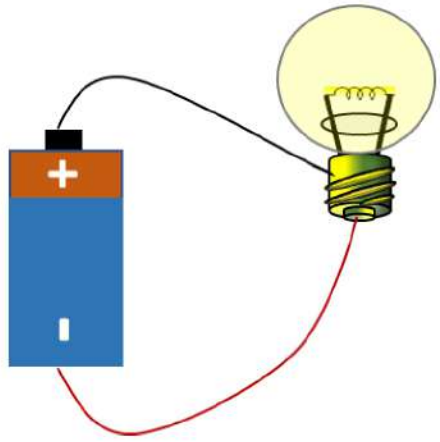
Example: Does the bulb glow in the given figure?



Solution: No. The bulb does not glow in this case. For a bulb to glow, the positive terminal of a battery is to be connected with one terminal of the bulb and the negative terminal of the battery is connected with other terminal of the bulb.

In the given image, one end of the battery is connected to one terminal of the bulb, but the other terminal of the battery is connected to the glass case of the bulb. Due to this the circuit is not complete and the bulb does not glow.

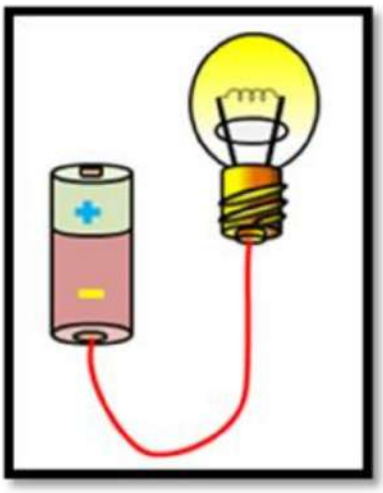
For the bulb to glow, the correct circuit is as shown in the adjacent figure.



Electric Circuit: When electric components like bulb, cell, wires etc. are connected with each other, the setup is called an electric circuit.

Tip: Remember the bulb glows only when current flows through the circuit.

Example: Ram made an electrical circuit using a bulb, wires and battery as shown in the image below.

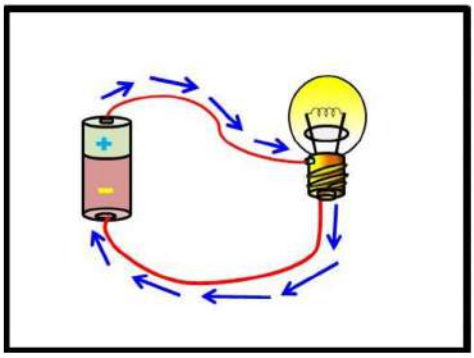


Can you help him to find in which direction the current is flowing in the circuit?

Solution: In the given question the negative terminal of a battery is connected to the bulb but the positive terminal of a battery is open, so the current does not flow through the bulb and the bulb will not glow.

If both the terminals are connected to the bulb then the bulb will glow.

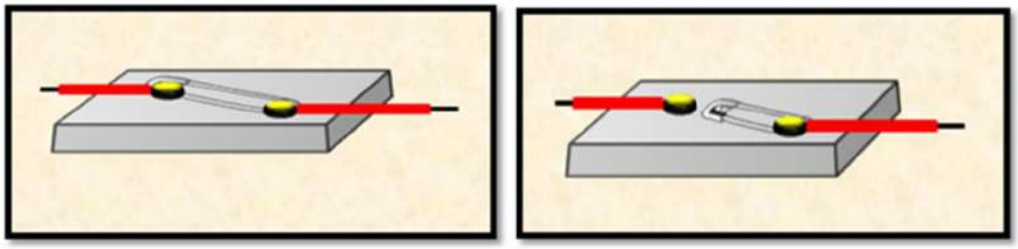
The electric circuit provides a complete path for electricity to pass (current to flow) between the two terminals of the electric cell. The bulb glows only when current flows through the circuit. In an electric circuit, the direction of current is taken to be from the positive to the negative terminal of the electric cell as shown in the figure below.



Fused: An electric bulb is said to be fused when it is connected to a cell in a circuit but does not glow. An electric bulb may fuse due to many reasons like if the filament of the bulb is broken the bulb does not glow.

Electric Switch, Conductor and Insulator

Electric Switch: A switch is a simple device that either breaks the circuit or completes it.



Switch ON Switch OFF

Conductor: The materials which allow the electric current to pass through them are conductors of electricity.

For examples: Coins, Metal wires, a sewing needle and an iron nail.

Insulator: The materials which do not allow the electric current to pass through them are called insulators.

For examples: Thermo col, Wood and Plastic scale.

Tip: The human body is a conductor of electric current. We have to be careful while handling electrical appliances.

Example: Why do the handles of the screwdrivers used by electricians usually have plastic or rubber covers on them?

Solution: Rubber and plastic are bad conductors of electricity. It does not allow current to flow through it. Hence, handles of tools such as screwdrivers which are used by electricians usually have plastic or rubber cover on them. This protects them from any electric shock.