

12. Electricity And Circuits

(By: J S Mishra)

Introduction to Electricity and Circuits

Electricity has become so common that sometimes we forget its immense applications.

Advantages of Electricity:

- Light in our houses, offices, roads etc. even past sunset
- To operate pumps which in turn have a lot of applications
- Electrical appliances like refrigerator, fans etc.
- Building houses, installing equipment etc.
- ★ Electricity that we use at homes, in our factories, is supplied from a power station.

Electric Cell: Electric cell is a source of electricity.

Features of an Electric Cell:

- It is a small cylindrical structure which helps in operating the devices.
- A small metal cap is placed on one side and a metal disc is present on the other side.
- All cells have two terminals: Positive and Negative.
- The metal cap and metal disc are positive (+) and negative (-) terminals of the electric cell respectively.
- Chemical energy is converted into electrical energy inside a cell. When the chemicals are exhausted, the cell stops working.

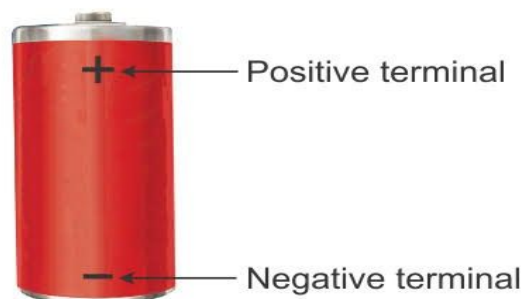
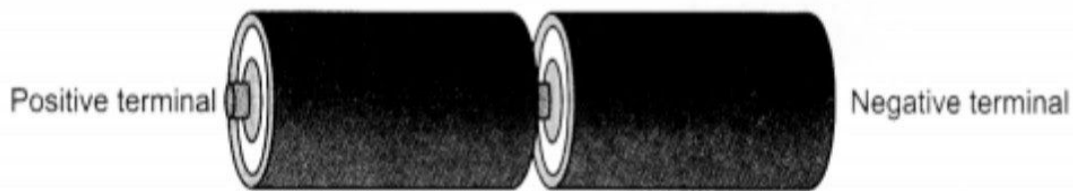


Fig: Electric cell

Battery: When two or more cells are joined together, the combination is called a battery.

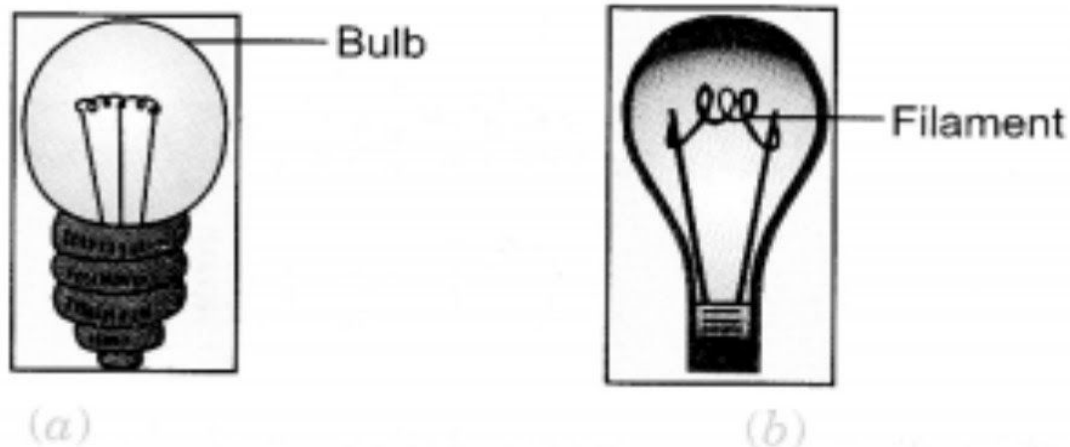


Two electric cells joined together

Bulb:

Features of an Electric Bulb:

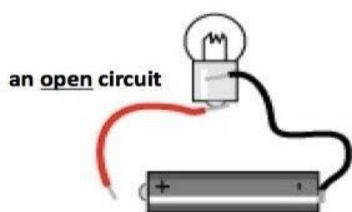
- The outer covering is glass and the base is metallic.
- The part of the bulb which glows is called Filament and is made up of tungsten.
- The filament is attached to two wires. One of the wires is connected to the metal case at the base and the other wire is connected to the metal wire at the centre of the base.
- Base of the bulb and metal tip are the terminals of the bulb and they do not touch each other.



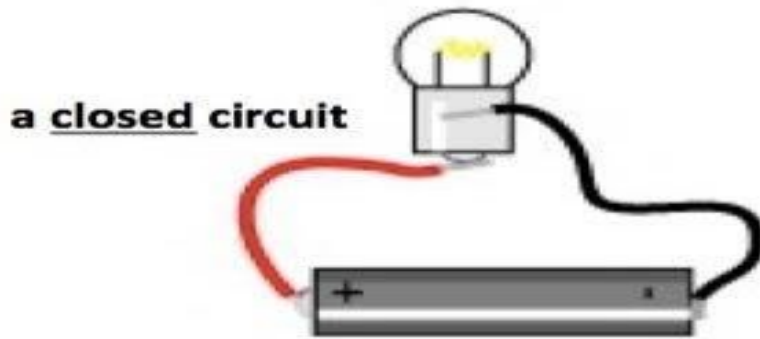
(a) Torch bulb (b) Inside torch bulb

Circuit: The complete path, from one terminal of the electric cell through the bulb and back to the other terminal of the electric cell, is called a circuit.

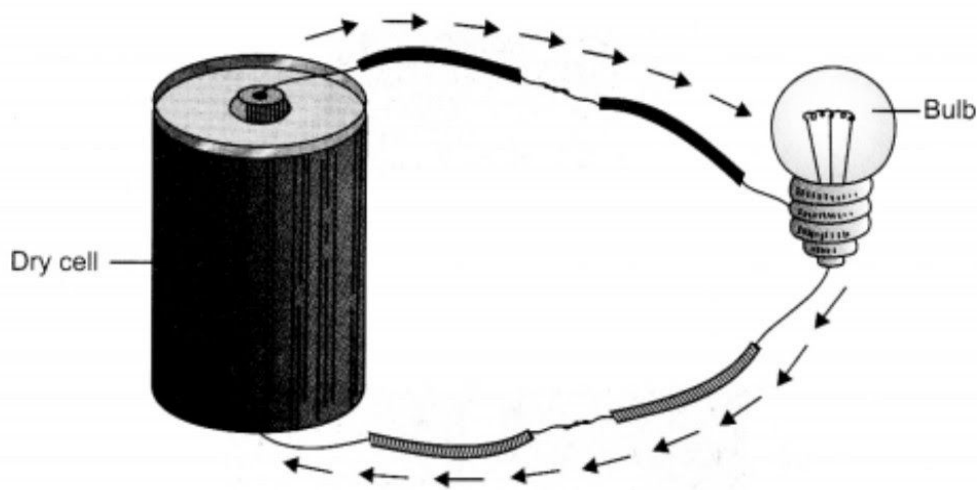
Open circuit: If there is any gap in the path of a circuit, the bulb does not light up. Such a circuit is called an open circuit.



Closed circuit: The bulb lights up only when a bulb and wire form a complete path, which starts at one terminal of an electric cell and ends at the other terminal. Such a circuit is called a closed circuit.



Flow of current in a circuit: As soon as the path from one terminal of electric cell to the other is completed, an electric current starts flowing through the circuit and the bulb lights up. The electric current flows from the positive terminal of the electric cell to its negative terminal.



Direction of current flow in an electric circuit

In the bulb, current enters through one of its terminals, flows through the filament inside the bulb and comes out through the other terminal of the bulb. When the current flows through the filament, it starts glowing.

Conductors and Insulators

Conductors:-

Materials through which electric current can flow are called conductors.

Most metals are conductors.

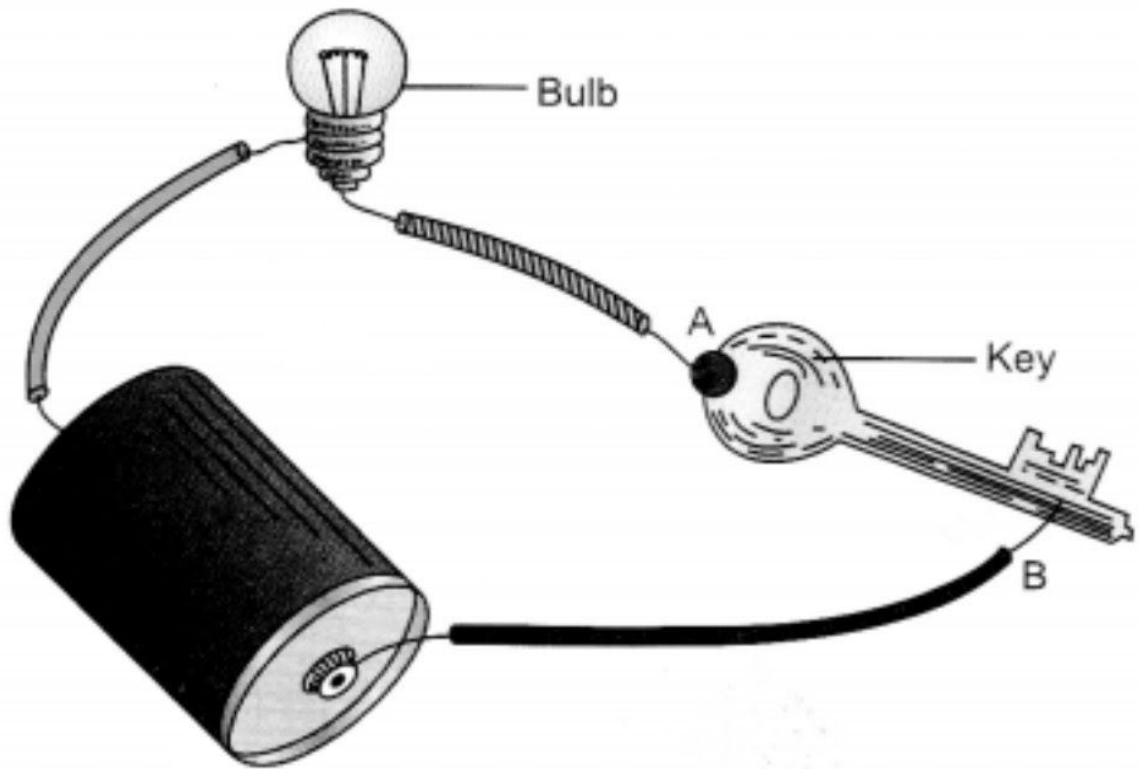
Our body is also a good conductor.

Insulators:-

Materials, through which the electric current cannot pass, are called insulators. In other words, insulators are the bad conductors of electricity.

Rubber and wood are insulators.

Conduction tester: It is a simple device to test whether a material is a conductor or insulator.



Conduction tester and key

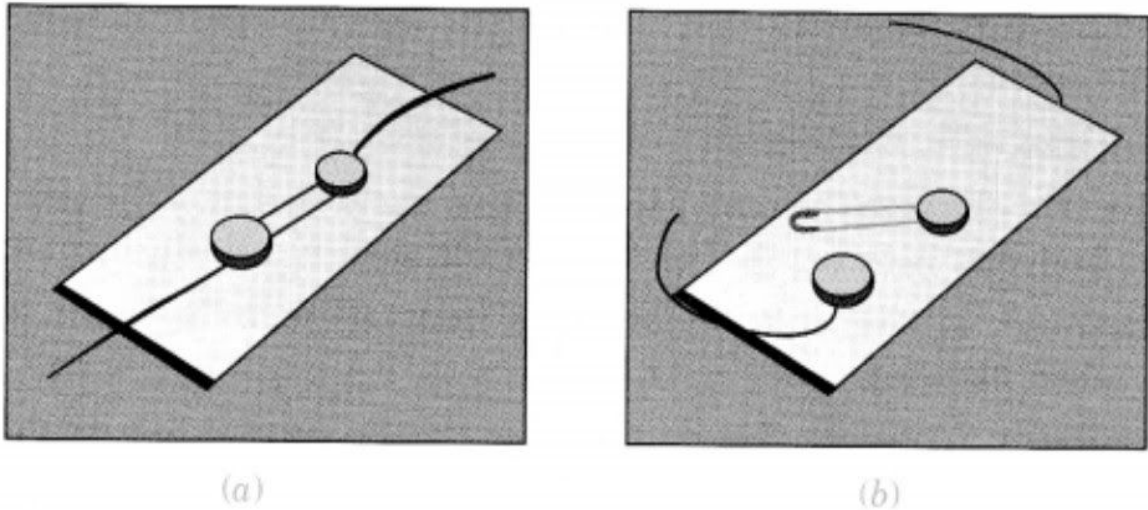
Fused bulb: If the filament of the bulb is broken, the circuit is not completed and hence the current cannot flow. The bulb with broken filament is called a fused bulb. When a bulb gets fused, it does not light up.



Electric switch: Electric switch is a simple device that either breaks the circuit or completes it to stop or start the flow of current.

When the switch completes the circuit, it is called closed switch.

When the switch breaks the circuit, it is called open switch.



(a) Closed switch (b) Open switch

Electric Torch

An electric torch has one or more dry cells inside it, which act as the 'source'. These cells are connected through a switch to a small bulb. When the switch is pushed to the 'on' position, the circuit is complete and the bulb glows. When the switch is pushed to the 'off' position, the circuit is incomplete (broken). Now the current cannot flow through the circuit, and the light goes out.

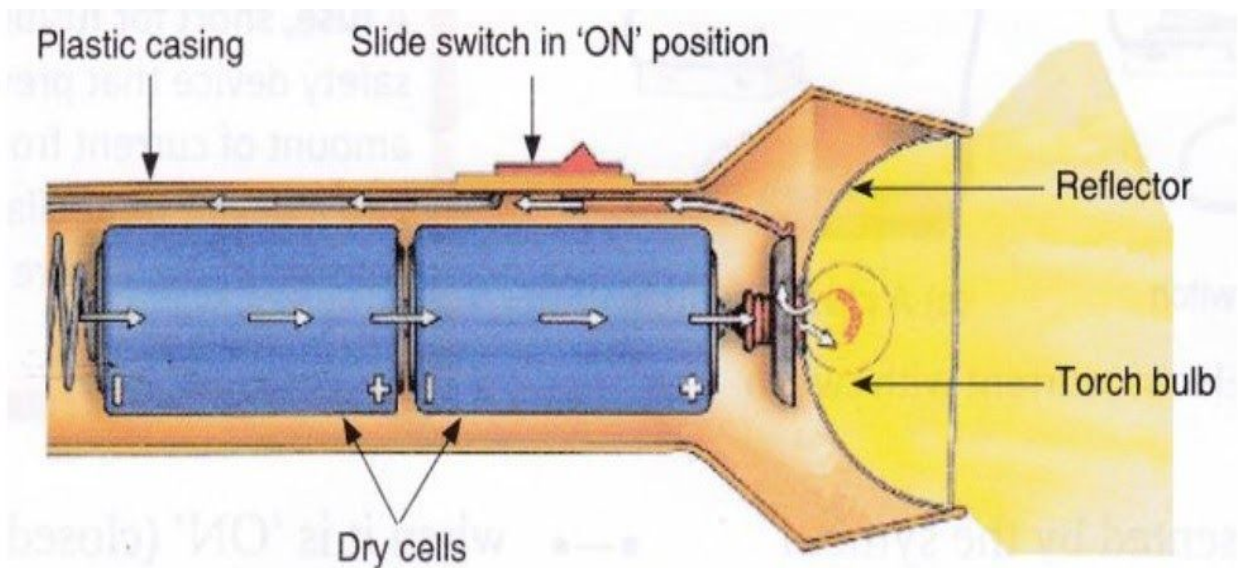


Fig- Electric Torch

Electrical Safety

Electricity can be very dangerous, if we do not handle electrical devices carefully.

★We should never play with electrical wires and sockets.

★Electricity from cells is safe but we have to be careful not to connect the two terminals of a cell directly through a wire/conductor.