

- **Electric Current:**

The flow of electrons in any material is termed an electric current.

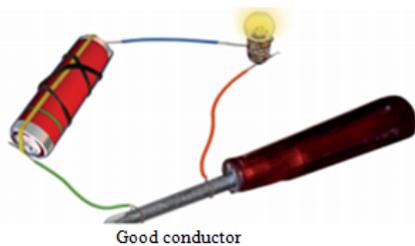
- **Good Conductors of Electricity:**

The materials which allow the current to pass through them are known as good conductors. Examples are copper, aluminium, etc.

- **Poor Conductors of Electricity:**

The materials which do not allow the current to pass through them are known as poor conductors. They are also called an insulator. Examples are glass, plastic, etc.

- **Tester:** It is a device to test if a particular material allows electric current to pass through it or not.

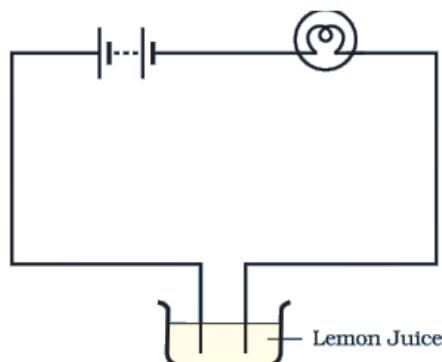


Tester

- **Conductivity in Liquids:**

(i) A tester can be used to check if a liquid is conducting or non-conducting.

(ii) To check if the liquid is conducting or not, connect the liquid between the two ends of the tester by properly completing the circuit's connection. If the bulb in the tester glows, it means the liquid is conducting. But, if it does not glow, then it means that the liquid is non-conducting.



Testing conduction of electricity in liquid

(I) Most liquids that conduct electricity are solutions of acids, bases and salts.

Good conductor	Poor conductor
Lemon Juice	Coal Tar
Vinegar	Distilled Water
Acid solutions	Honey
Basic solutions	Vegetable oil
Salty water ( Tap water, seawater)	Kerosene

- **Heating effect of current:**

The heating effect of the current is responsible for the glowing of the bulb.

**To test whether a substance is conducting or not using**

**Heating effect:**

When current passes through the bulb, the filament gets heated to a high temperature, and as a result, the bulb starts glowing. But, if the current is very small, then the filament will not get heated to a high temperature and will not glow.



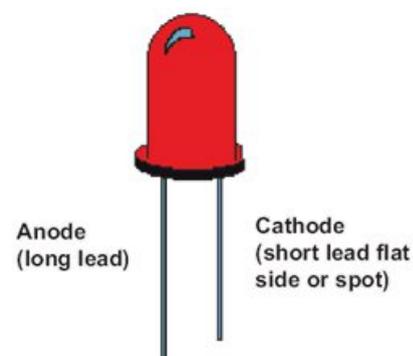
- **LED (Light Emitting Diodes):**

LED's can be used to detect weak currents since; their filament

does not require much temperature to glow.

They have two terminals called anode and cathode. The length of the anode lead is slightly longer than the cathode lead. It is always connected to the positive terminal of the battery. On the other hand, cathode lead is shorter and connected to the battery's negative terminal.

Heating Effect of Electric Current for Glowing Bulb



- **Magnetic effect of current:** The magnetic effect of current is responsible for the deflection in the magnetic compass when the current passes nearby it. It can detect weak currents.

## ☑ To test whether a substance is conducting or not using magnetic effect:

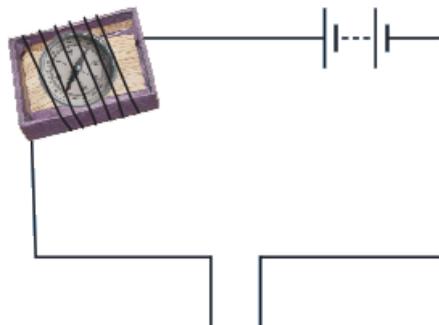
For a closed circuit, when current passes nearby, a magnetic needle and if the deflection is observed in the needle, then it means the substance is conducting; otherwise, it is non-conducting.



### Magnetic Compass

#### Tester By using Magnetic Compass:

- (i) Take the tray from inside a blank matchbox.
- (ii) Wrap an electric wire a few times around the tray.
- (iii) Insert a small compass needle inside it.
- (iv) Now connect one free end of the wire to the terminal of a battery. Leave the other end free.
- (v) Take another piece of wire and connect it to the other terminal of the battery



#### Tester by using the magnetic compass

Join the free ends of two wires momentarily. The compass needle should show deflection. Your tester with two free ends of the wire is ready.

Touch both ends of the tester to any substance to check whether the substance is conducting the electricity or not. If the deflection is observed in the needle, it means the substance is conducting; otherwise, it is non-conducting.

## ☑ Tap Water:

The water obtained from various sources like rivers, wells, taps, etc., is not in its purest form. It contains many impurities. These impurities include different salts too. As a result of these salts, tap water becomes a good conductor of electricity.

## ☑ Distilled Water:

It is the purest form of water and does not contain any impurities. Hence, it is a poor conductor of electricity.

We can check the conductivity of tap water or distilled water via the magnetic tester.

## ● Chemical Effects of Electric Current:

### Electrodes:

These are conducting materials through which current enters or leaves a substance.

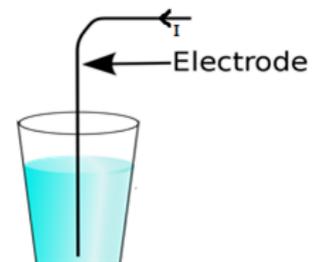
## ● Types of Electrodes:

### (i) Positive Electrode:

It is the electrode that is connected to the positive terminal of the battery. It is also known as an anode.

### (ii) Negative Electrode:

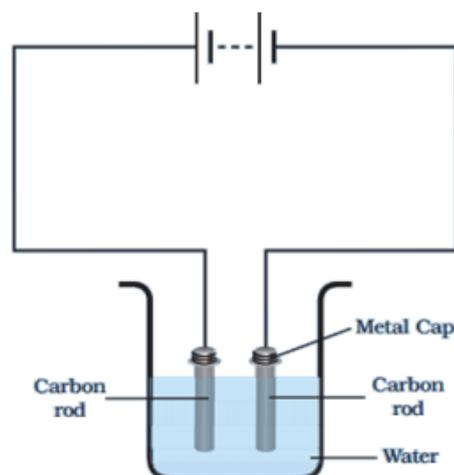
It is the electrode that is connected to the negative terminal of the battery. It is also known as cathode.



**There can be various chemical effects observed on passing electric current depending on the type of solution and electrodes:**

## 1. Formation of Gas Bubbles:

A British Chemist named William Nicholson performed an experiment showing that if the current is passed through water, oxygen and hydrogen bubbles were produced. The oxygen bubbles will be present on the positive electrode and hydrogen bubbles on the negative electrode. The passage of an electric current through a conducting solution causes chemical reactions. As a result, bubbles of a gas may be formed on the electrodes



## Passing current through water

2. Deposits of metal may be visible on the electrodes.
3. The colour of the solution might change.

- **Electroplating:**

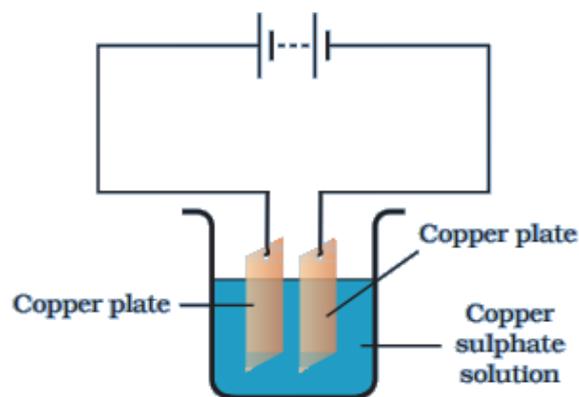
The process using which layer of some metal is deposited on another material by using electricity is known as electroplating.

- **Experiment:**

We need to take copper sulphate and two copper plates of the same size. Take 250 mL of distilled water in a clean and dry beaker.

Dissolve two teaspoonfuls of copper sulphate in it. Add a few drops of dilute sulphuric acid to copper sulphate solution to make it more conducting.

Connect the copper plates to the terminals of a battery and immerse them in copper sulphate solution.



Connect the circuit as shown in the figure.

When current is allowed to pass through the copper sulphate solution, then the solution will separate into copper and sulphate.

The separated free copper of the solution will get deposited on the negative electrode.

And the same amount of copper will get dissolved in the solution from the positive electrode.

Hence, we can say that copper from the positive electrode got transferred to the negative electrode.

This kind of transfer is known as electroplating.

- **Applications of Electroplating:**

(i) It is used in industries for coating different metals on other metal objects. For example, chromium is lustrous, corrosion-free, scratch-resistant, etc. Still, as it is costly, it is deposited on materials like car parts, taps, burners, etc., to lower the manufacturing cost.

(ii) Silver and gold are deposited on cheaper materials by jewellers to lower the jewellery cost, keeping the appearance intact.

(iii) Iron cans are electroplated with tin used for storing food. Iron gets easily rusted and protects the food from spoiling.

(iv) Zinc is deposited on iron used to construct bridges, vehicles, etc., to protect it from rust and corrosion.