

## Chapter – 14

### Chemical Effects of Electric Current

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#### Do Liquids Conduct Electricity?

**Good Conductors:** The materials, which allow the electric current to pass through them easily are called good conductors of electricity.

**Bad Conductors:** The materials, which do not allow the electric current to pass through them easily are called bad conductors of electricity.

**Liquid conducts electricity:** A liquid that conducts electricity is called an electrolyte. They are mostly solutions of acids, bases and salts in water.

**Example:** Choose which of the following is not a good conductor of electricity?

- i. Orange juice
- ii. Distilled water
- iii. Sodium hydroxide solution

**Solution:** The correct option is (ii) Distilled water.

Sweet lime and orange juice are acidic in nature whereas sodium hydroxide (NaOH) is basic in nature. Therefore, they are good conductors of electricity whereas distilled water is not a good conductor because distilled water is free of salts. Hence, it is a poor conductor of electricity.

Distilled water can conduct electricity when some salt is added to it.

**Tip:** Non-conducting liquid starts conducting when salt, acid or base is added to the solution.

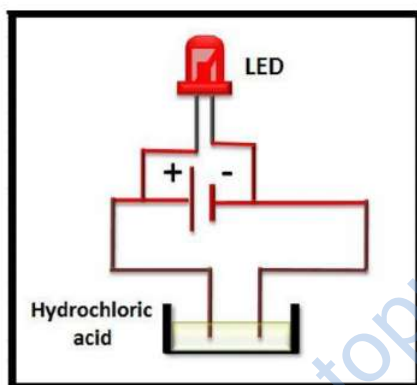
**Some examples of conducting liquids:** Lemon juice, orange juice, sodium hydroxide solution, milk, salt solution, seawater, tap water, Vinegar.

**Some examples of non-conducting liquids:** Sugar solution, distilled water, honey, kerosene oil, vegetable oil.

**Tip:** While reasoning about why any liquid conduct or does not conduct electricity must mention the reason that ions are present or not present in the liquid respectively.

**Tester:**

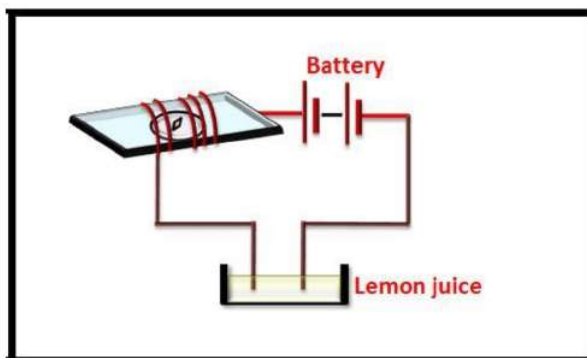
1. **LED as a tester:** LED (Light-emitting diode) is used in place of a bulb for detecting whether a weak electric current is conducting through a liquid or not. It is based on the heating effect of electric current.



The longer lead of the LED is connected to the positive terminal of the battery and the shorter lead is connected to the negative terminal.

**Tip:** Remember bulb is used as a tester when a strong current is passing through the circuit and LED is used when a weak current is passing through the circuit.

2. **Compass as a tester:** This tester is based on the magnetic effect of electric current.



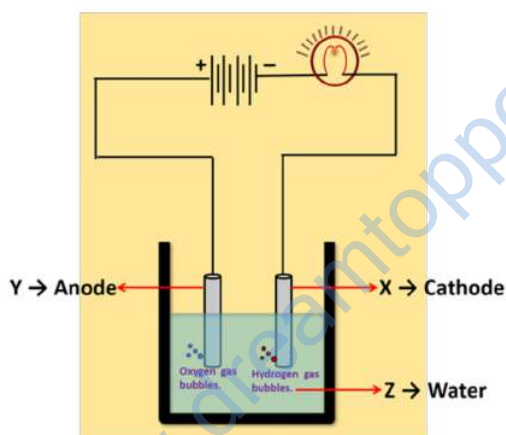
When a weak or strong electric current conducts through the liquid in the circuit shown the magnetic needle of the compass show deflection.

This is used to detect whether the given liquid conduct electricity or not.

### Chemical Effects of Electric Current

**Chemical effects of electric current:** When the electric current is passing through a substance, chemical changes occur in it.

**Example:** When an electric current is passing through the water it causes chemical reactions. The Oxygen bubbles formed on the cathode and hydrogen bubbles formed on the anode.



Note: Electrodes are the good conductors of electricity from which electric current enters or leaves the circuit. The electrode connected with the positive terminal of the battery is called the anode and the electrode connected with the negative terminal of the battery is called the cathode.

**Tip:** Remember these three are the possible results when an electric current is passing through the liquid.

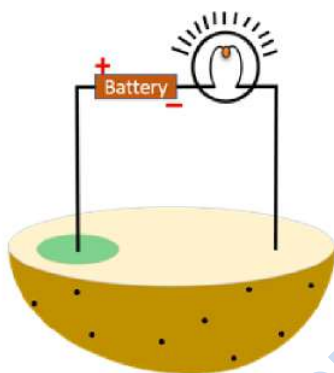
- 1) Bubbles of gas may be formed at electrodes.
- 2) Deposits of metal may be seen on electrodes.
- 3) Change of colour of the solution may occur.

**Potato as a tester for positive terminal of the battery:** When we insert the end of the copper wire connected with the battery in a potato, the negative charge

starts flowing in the circuit due to the juice present in the potato which works as an electrolyte and completes the circuit.

Because of this negative charge in the potato, copper from the copper wire mix in the potato and form a greenish-blue spot. The greenish-blue spot always forms at the positive terminal.

It is used as a tester for the positive terminal of the battery.



**Tip:** Remember If the conducting wire is different the colour of the spot form is also different.

Like potatoes, many vegetables and fruits conduct electricity due to the presence of some acid, base and salt. Example: Orange, apple, tomato etc.

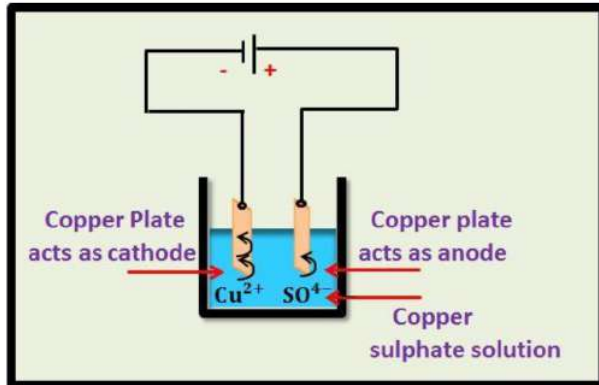
## Electroplating

**Electroplating:** The process of depositing a thin layer of any desired metal on another material with the help of an electric current is called electroplating.

**Example:** When the electric current passes through the copper sulphate solution, copper sulphate dissociates into copper and sulphate. The free copper gets drawn to the electrode connected to the negative terminal of the battery and gets deposited on it.

From the other electrode (a copper plate) an equal amount of copper gets dissolved in the solution. Thus, the loss of copper from the solution is restored and the process keeps going.

This means that copper gets transferred from one electrode to the other by passing the electric current. Electroplating is also a chemical effect of electric current.



### Applications of electroplating:

1. Chromium has a shiny appearance. It does not corrode and help to resist scratches. Because of this chromium is electroplated on many metallic objects like wheel rims, bath taps, kitchen gas burners and many others.
2. Tin cans used for storing food are made by electroplating tin on iron. Because the tin is less reactive as compared to the iron. Therefore, food does not spoil as it does not come in contact with iron.
3. In bridges and automobile, iron is used to provide strength. Iron is subject to corrode or rust. Therefore, zinc is deposited over iron to protect it from corrosion and the formation of rust. This is because Zinc is more reactive than iron.
4. The artificial ornaments are less expensive metals that electroplate with metals like silver or gold. These ornaments have the appearance of silver or gold but they are much less expensive than silver or gold ornaments.