

UNIT: 5 - ELECTRICITY

CLASS: VIII

SUBJECT: SCIENCE

I. Choose the best answer.

- When an ebonite rod is rubbed with fur, the charge acquired by the fur is
a) negative **b) positive** c) partly positive and partly negative d) None of these
- The electrification of two different bodies on rubbing is because of the transfer of
a) neutrons b) protons **c) electrons** d) protons and neutrons
- Which of the following a simple circuit must have?
a) Energy source, Battery, Load b) Energy source, Wire, Load
c) Energy source, Wire, Switch **d) Battery, Wire, Switch**
- An electroscope has been charged by induction with the help of charged glassrod. The charge on the electroscope is
a) negative **b) positive** c) both positive and negative d) None of the above
- Fuse is
a) a switch b) a wire with low resistance
c) a wire with high resistance **d) a protective device for breaking an electric circuit**

II. Fill in the blanks.

- Transfer of electron** takes place by rubbing objects together.
- The body which has lost electrons becomes **Positive**.
- Lightning arrestor** is a device that protects building from lightning strike.
- Electric fuse** has a thin metallic filament that melts and breaks the connection when the circuit is overheated.
- Three bulbs are connected end to end from the battery. This connection is called **Series circuit**.

III. State true or false. If false, correct the statement.

- The charge acquired by an ebonite rod rubbed with a piece of flannel is negative. **True**
- A charged body induces an opposite charge on an uncharged body when they are brought near. **True**
- Electroscope is a device used to charge a body by induction. **True**
- Water can conduct electricity. **True**
- In parallel circuit, current remains the same in all components. **False**

IV. Match the following.

- | | | |
|--|---|-------------------------------------|
| 1. Two similar charges | - | Repel each other |
| 2. Two dissimilar charges | - | Attract each other |
| 3. When glass rod is rubbed with silk | - | Acquires a positive charge |
| 4. When ebonite rod is rubbed with fur | - | Acquires a negative charge |
| Fuse | | prevents a circuit from overheating |

V. Give reason for the following.

1. When a glass rod is rubbed with silk cloth both get charged.

Reason:

When a glass rod is rubbed with a silk cloth the free electrons in the glass rod are transferred to silk cloth. It is because the free electrons in the glass rod are less tightly bound as compared to that in silk cloth.

Since the glass rod loses electrons, it has a deficiency of electrons and hence acquires positive charge. But, the silk cloth has excess of electrons. So, it becomes negatively charged.

2. When a comb is rubbed with dry hair it attracts small bits of paper.

Reason:

Comb rubbed with hair gains electrons from the hair and becomes negatively charged. These electrons are accumulated on the surface of the comb.

When a piece of paper is teared into bits, positive and negative charges are present at the edges of the bits.

Negative charges in the comb attract positive charges in the bits. So, the paper bits are moving towards the comb.

3. When you touch the metal disc of an electroscope with a charged glass rod the metal leaves get diverged.

Working of Electroscope

When the brass disc of the electroscope is touched by a charged object, electric charge gets transferred to the gold leaf through the rod.

This results in gold leaves moving away from each other. This happens because both the leaves have similar charges.

4. In an electroscope the connecting rod and the leaves are all metals.

Reason:

These are made of metals so that the electrons become free to move.

5. One should not use an umbrella while crossing an open field during thunderstorm.

Reason:

1. Carrying an umbrella is not advisable during thunderstorm.
2. As the rod of umbrella and its supporting wires are made up of metals.
3. Thus during thunderstorm, the conducting object should be avoided.

VI. Consider the statements given below and choose the correct option.

1. **Assertion:** People struck by lightning receive a severe electrical shock.

Reason: Lightning carries very high voltage.

(a) Both assertion and reason are true and reason is the correct explanation of assertion.

2. **Assertion:** It is safer to stand under a tall tree during lightning.

Reason: It will make you the target for lightning.

d) Assertion is false but reason is true.

a) Both assertion and reason are true and reason is the correct explanation of assertion.

b) Both assertion and reason are true and reason is not the correct explanation of assertion.

c) Assertion is true but reason is false.

d) Assertion is false but reason is true.

VII. Answer briefly.

1. How charges are produced by friction?

☞ Rubbing certain materials with one another can cause the built-up of electrical charges on the surfaces. From this it is clear that charges are transferred friction.

Example:

Combing hair charges are transferred from the hair to comb due to friction.

2. What is earthing?

Earthing is the process of connecting the exposed metal parts of an electrical circuit to the ground.

3. What is electric circuit?

The path through which electrons flow from one terminal to another terminal of the source, is called electric circuit.

4. What is electroplating?

The process of depositing a layer of one metal over the surface of another metal by passing electric current is called electroplating.

5. Give some uses of electroplating.

Electro plating is applied in many fields. We use iron in bridges and automobiles to provide strength. However, iron tends to corrode and rust. So, a coating of zinc is deposited on iron to protect it from corrosion and formation of rust. Chromium has a shiny appearance. It does not corrode. It resists scratches.

VIII. Answer in detail.

1. Explain three ways of charge transfer.

Transfer of charges takes place in the following three ways:

- ❖ Transfer by Friction
- ❖ Transfer by Conduction
- ❖ Transfer by Induction

Transfer by Friction

- ❖ rubbing certain materials with one another can cause the build-up of electrical charges on the surfaces. From this it is clear that charges are transferred by friction.
- ❖ While combing hair, charges are transferred from the hair to comb due to friction.

Transfer by Conduction

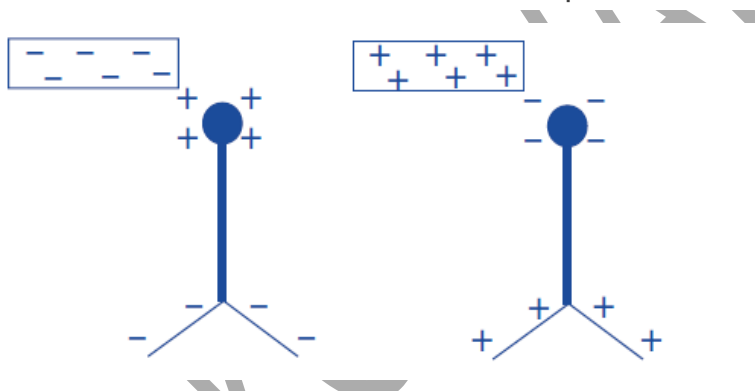
- ❖ we can say that charges can be transferred to an object by bringing it in contact with a charged body. This method of transferring charges from one body to other body is called transfer by conduction.
- ❖ when the ebonite rod is rubbed with woollen cloth, electrons from the woollen cloth are transferred to the ebonite rod. Now ebonite rod will be negatively charged. When it is brought near the paper cylinder, negative charges in the rod are attracted by the positive charges in the cylinder. When the cylinder is touched by the rod, some negative charges are transferred to the paper. Hence, the negative charges in the rod are repelled by the negative charges in the cylinder.

Transfer by Induction

- ❖ The process of charging an uncharged body by bringing a charged body near to it but without touching it is called induction
- ❖ we can charge an uncharged object when we touch it by a charged object. But, it is also possible to obtain charges in a body without any contact with other charged body

2. What is electroscope? Explain how it works.

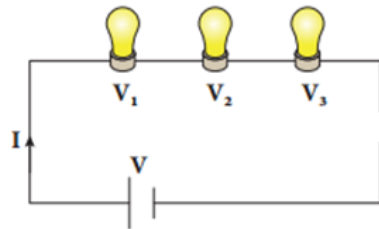
- ❖ An electroscope is a scientific instrument used to detect the presence of electric charge on a body.
- ❖ An electroscope is made out of conducting materials, generally metal.
- ❖ It works on the principle that like charges repel each other.
- ❖ In a simple electroscope two metal sheets are hung in contact with each other.
- ❖ They are connected to a metal rod that extends upwards, and ends in a knob at the end.



- ❖ If you bring a charged object near the knob, electrons will either move out of it or into it.
- ❖ This will result in charges on the metal leaves inside the electroscope.
- ❖ If a negatively charged object is brought near the top knob of the electroscope, it causes free electrons in the electroscope to move down into the leaves, leaving the top positive..
- ❖ Since both the leaves have negative charge, they repel each other and move apart.
- ❖ If a positive object is brought near the top knob of the electroscope, the free electrons in the electroscope start to move up towards the knob.
- ❖ This means that the bottom has a net positive charge. The leaves will spread apart again. Explain series and parallel circuit.

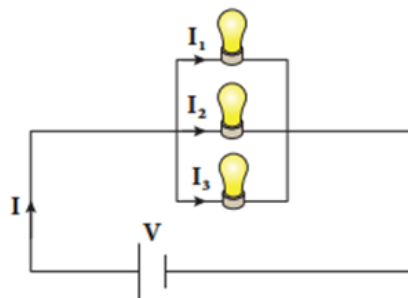
3. Explain series and parallel circuit.

Series Circuit:



1. A series circuit is one that has more than one resistor (bulb) but only one path through which the electrons can travel.
2. From one end of the battery the electrons move along one path with no branches through the resistors (bulbs) to the other end of the cell.
3. All the components in a series circuit are connected end to end.
4. So, current through the circuit remains same throughout the circuit.
5. But, the voltage gets divided across the bulbs in the circuit.
6. In the following series circuit two bulbs are used as resistors.
7. Let I be the current through the circuit and V_1, V_2, V_3 be the voltage across each bulb.
8. The supply voltage V is the total of the individual voltage drops across the resistances. $V = V_1 + V_2 + V_3$

Parallel Circuit:

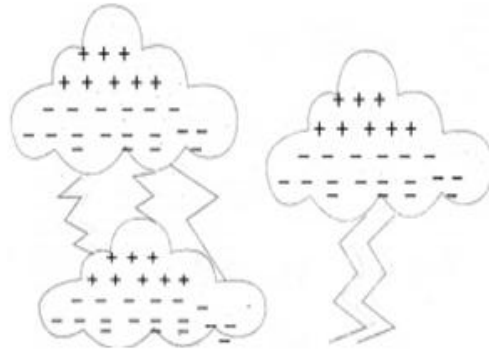


1. In a parallel circuit, there is more than one resistor (bulb) and they are arranged on many paths.
2. This means charges (electrons) can travel from one end of the cell through many branches to the other end of the cell.
3. Here, voltage across the resistors (bulbs) remains the same but the current flowing through the circuit gets divided across each resistor.
4. Let us consider three bulbs connected in parallel.
5. Let V be the voltage across the bulbs and I_1, I_2, I_3 be the current across each bulb.
6. The current I from the battery is the total of the individual current flowing through the resistances. $I = I_1 + I_2 + I_3$

4. How lightning takes place?

1. Lightning is produced by discharge of electricity from cloud to cloud or from cloud to ground.

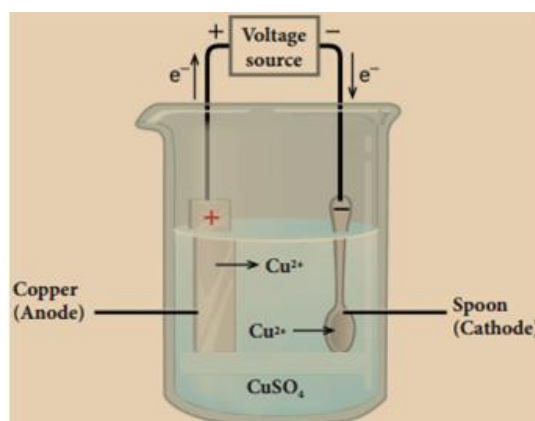
2. During thunderstorm air is moving upward rapidly.
3. This air which moves rapidly, carries small ice crystals upward.
4. At the same time, small water drops move downward.
5. When they collide, ice crystals become positively charged and move upward and the water drops become negatively charged and move downward.



6. So the upper part of the cloud is positively charged and the lower part of the cloud is negatively charged.
7. When they come into contact, electrons in the water drops are attracted by the positive charges in the ice crystals. Thus, electricity is generated and lightning is seen.
8. Sometimes the lower part of the cloud which is negatively charged comes into contact with the positive charges accumulated near the mountains, trees and even people on the earth. This discharge produces lot of heat and sparks that results in what we see as lightning.

5. What is electroplating? Explain how it is done.

Electroplating:



- ❖ Electroplating is one of the most common applications of chemical effects of electric current.
- ❖ The process of depositing a layer of one metal over the surface of another metal by passing electric current is called electroplating.

- ❖ Take a glass jar and fill it with copper sulphate solution.
- ❖ Take a copper metal plate and connect it to the positive terminal of battery.
- ❖ Connect an iron spoon to the negative terminal of the battery.
- ❖ Now, dip them in the copper sulphate solution.
- ❖ When electric current is passed through the copper sulphate solution, you will find that a thin layer of copper metal is deposited on the iron spoon and an equivalent amount of copper is lost by the copper plate.

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