

8th – SOME NATURAL PHENOMENON I



Electric charges: We already know that atoms are made of protons neutrons and electrons. The positively charged particles in an atom are called protons. The negatively charged particles are called electrons. The atom as a whole consist of an equal number of positive and negative charges, and in such a case of the atom is said to be electrically neutral. If, however the charges are not balanced, the object will have an electric charge (positive charge if protons are more in number than electrons and negative charge if electrons are more in number than protons. If two objects having the same type of charge are brought close together, they repel each other (i.e. push each other away) however if the two objects having the opposite type of charge. (positive- negative or negative-positive), they attract each other. Therefore, we can say, like charges repel each other and unlike charges attract each other.

Charging an Object: Atoms usually have equal number of positive and negative charges, and are, therefore, electrically neutral. This is the reason why most objects around us are electrically neutral. An electrically neutral object can be charged by using any of the following methods.

Charging by friction: This kind of charging is done by rubbing one material with another. This produces on equal and opposite charge in both the bodies. The most common examples are rubbing glass with silk, and ebonite (a kind of hard rubber) with wool.

Charging by conduction: An object can also be charged by touching it to a charged body. For example, if we take a charged glass rod and touch it to a metal object, the metal object will also get a charge. This is called charging by conduction.

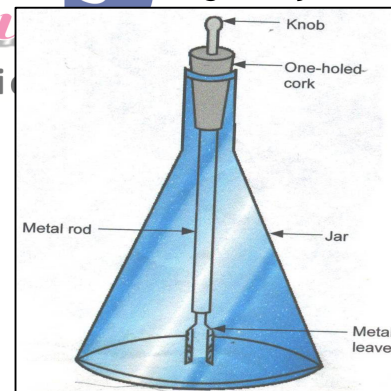
Charging by induction: In charging by induction, charging is done without touching the charged body to the object that has to be charged. For example, a charged glass rod is brought close to a metal object, but does not touch it.

Transfer of charge: Electric charge can be transferred from a charged object to another through a metal conductor. A device working on this principle is the electroscope, which is used to detect and measure electric charge. It consists of two very thin metal strips (called leaves, because they are very thin) connected to a metal knob through a metal rod. Here is how it works

1. A charged object is touched to the knob of the electroscope.
2. The charge is transferred to the thin metal strips through the metal rod.
3. The metal strips repel each other (because they have similar charges) and separate out. The electroscope can, therefore, be used to check if a body carries a charge.

When a charged object comes in contact with a body which is not charged, electric charges jump from the charged body to the uncharged body till the charges on the two bodies are equalized. This process is referred to as discharging.

Earthing: When a body comes in contact with the earth, either directly or indirectly, then the charges are discharged to the earth. This is called earthing.



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The process of transfer of charges from a charged object to the earth is called earthing or grounding.

Lightning: lightning occurs because of a massive electric charge flowing from cloud to cloud, from one part of the cloud to another, or from a cloud to the ground. Thunder clouds carry electric charges, and these charges separate out within the cloud. The lower portion of a cloud generally carries negative charges and the upper portions carry positive charges. These charges keep building up. Normally, charges do not flow easily through air. Air is an insulator, but when a huge amount of charges builds up, the insulating property of air breaks down. The path of conductive air (due to charged particles) which extends from the thundercloud is made by what is called a step leader. The step leader is not as bright as the flash of lightning. A very large amount of electric current is generated during a lightning strike. The air in the path of lightning heats up enormously. The enormous amount of heat produced makes the air expand very suddenly. This causes a wave of vibrations (called a shock wave), which is the cause of the thunder.

Lightning conductors: Lightning conductors are used to protect buildings from the damaging effects of lightning. Lightning strikes buildings or other objects because the materials in them provide an easier path to ground than air. The basic idea behind lightning protection is to provide a direct, easy path for the lightning bolt to enter the ground without passing through a building or any other objects. The lower end of the lightning conductor is connected to a metal plate, which is buried deep under the ground.

Safety Measures Against Lightning Strikes: Lightning usually strikes tall buildings and trees. Here are some safety measures you can take if you are caught in a thunderstorm.

- Do not take shelter under a tree.
- Try to take shelter indoors
- You can even take shelter inside a car or a bigger vehicle like a truck.
- Do not run across a large open field, or high ground.
- If you cannot find a safe place, squat down in a low-lying place.