Chapter – 15

Some Natural Phenomena

Charging by Rubbing

Electric Charge: Electric charge is the property of matter due to which it experiences electrical phenomena.

Charging by rubbing: When two objects are rubbed with each other they both acquire charge. E.g. When you rub a comb on your dry hair, the comb can attract very small pieces of paper as they both get charged.

Cause: When objects are rubbed with each other, friction occurs between the surfaces of two objects which produce the heating energy due to which charge is generated on the surfaces.

Static Charge: The electric charges generated by rubbing are called static charge as they hold on the surface and does not move.

Tip: Remember conductors like aluminium, copper, iron does not charge easily on rubbing because the charges start flowing across the conductor and produce an electric current.

Types of Charges and Their Interaction

Type of charges: There are two types of charges positive (+) charge and negative (-) charge.

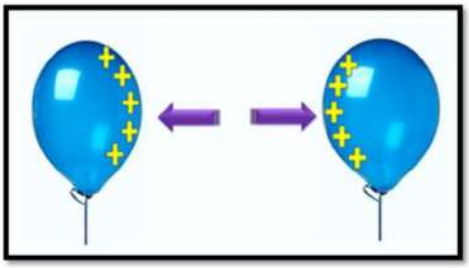
- Conventionally when the glass rod is rubbed with the silk cloth the charge acquired by the glass rod is taken as positive and the charge on the silk cloth is taken as negative.

Interaction between charged objects:

- Two objects having similar types of charges always repel each other.

  (+ve charge repel +ve charge and -ve charge repel -ve charge).

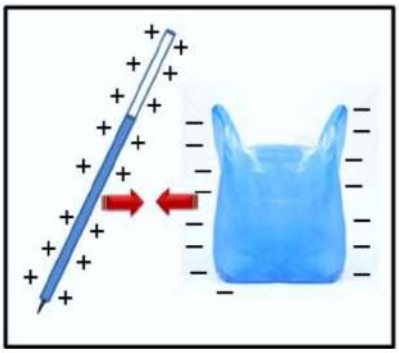
  Example: Two positively charged balloons repel each other.



- Two oppositely charged objects always attract each other.

  (+ve charge attract -ve charge)

  Example: When a plastic refill is rubbed with polythene.

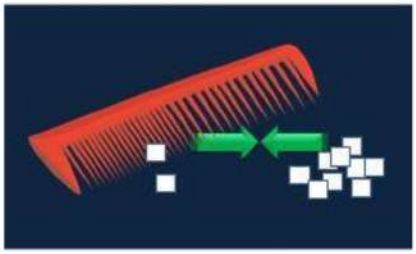


Tip: Remember two same objects when rubbed they acquire similar types of charges.

e.g. Two balloons when rubbed against the wall.

Interaction between charged and uncharged object: A charged object attracts an uncharged object when they come closer to each other. Because when any charged object comes closer to the uncharged object, the opposite charge is induced in the uncharged object due to the electric induction.

E.g. When you rub a comb on your dry hair, after that the comb can attract very small pieces of paper as they both get charged.



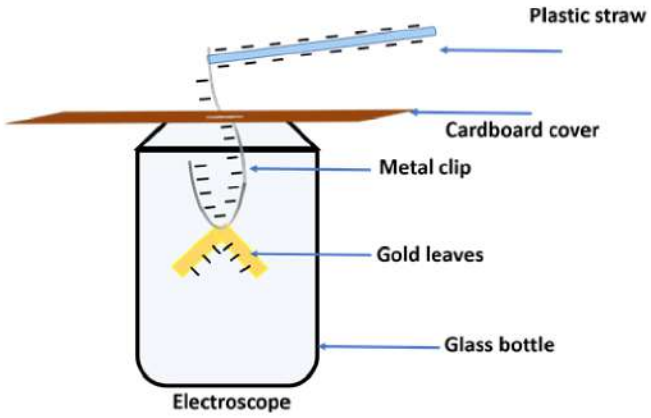
Transfer of Charge

Electroscope: A device used to test whether an object is carrying a charge or not such a device is called an electroscope.

Working: When we touch the charged object with the metal clip, the charge flow in the metal and both the golden leaves get charged with the same polarity. Hence, they repel each other.

We can conclude that the electrical charge can be transferred from a charged object to another uncharged object through a metal conductor. This process is called charging by conduction.

The divergence in the golden leaves shows that the object is charged.



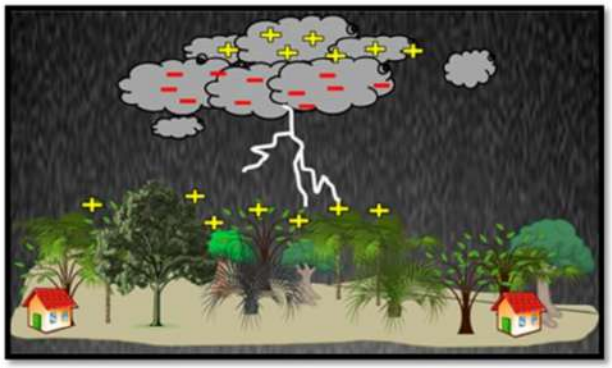
Tip: Remember when a person touches the top of the metal clip, the foil strips converge or they come back to their original state. This has happened because the charge on the foil strips loses charge to the earth through the person's body and there is no repulsion between the foil strips.

The process of loss of charge by the charged object is called discharging.

Earthing: The process of transferring charge from a charged object to the earth is called an earthing.

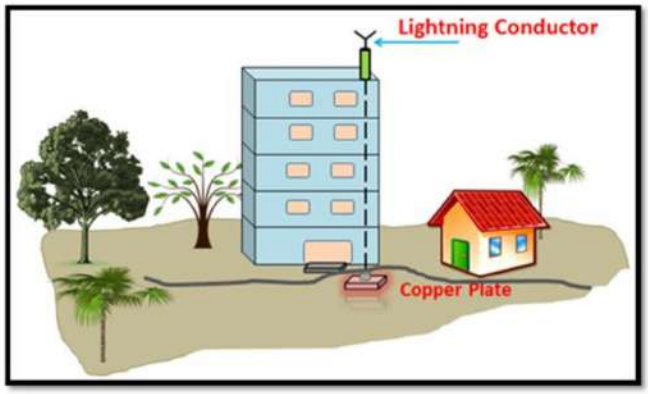
Lightning and Lightning Safety

Lightning: Lightning is caused by the accumulation of charges which get electrically discharged between clouds and the earth surface or between different clouds.



Tip: Remember the lightning happens more often at higher points (hills) because clouds are nearer to the earth's surface at higher points.

Lightning conductor: A lightning conductor is a device (metallic rod) that is used to protect a building from lightning. The rod transfers the electric charge of the lightning to the ground.



Tip: The lightning conductor is always taller than the building.

Lightning safety:

These are the Safety measures when the lightning strikes:

1) After hearing the last thunder, wait for some time before coming out of the safe place.

2) If you are in travelling by car or by bus you are safe inside with the windows and doors of the vehicle shut.

3) The open vehicle is not safe like motorbikes, tractors etc.

4) Taking shelter under a tree is not safe as lightning can strike the tree. If you are forced to take shelter under a tree then choose a short tree.

5) An open place is not a safe place. If you cannot find any shelter, squat low on the ground.

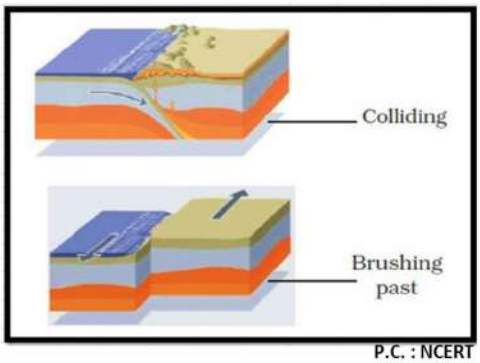
6) Do not stand on high ground because clouds are nearer to the earth at the high ground.

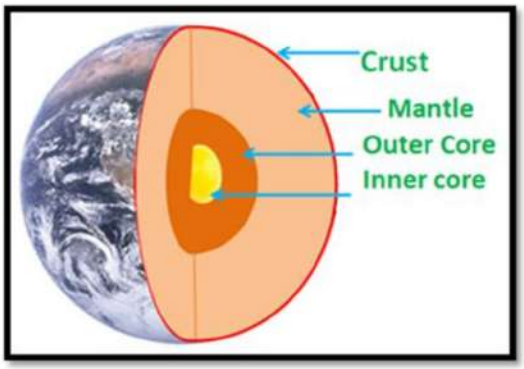
7) Stay away from wires, fences, metal pipes and wires communication.

Earthquakes

Earthquakes: An earthquake is a sudden shaking or trembling of the earth lasting for a very short time.

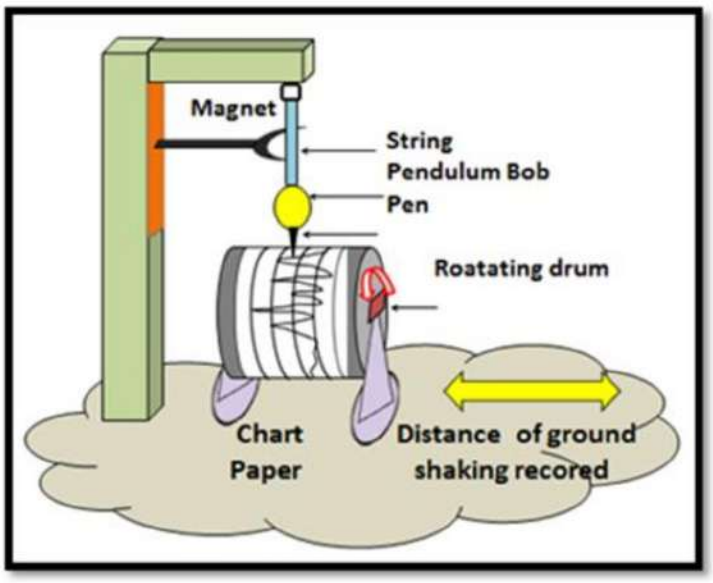
Cause: It is caused by a disturbance deep inside the earth's crust which happens when moving plates of the earth crust slide past one another or collide with one another.





Richter scale: The power of an earthquake is expressed in terms of magnitude on a scale called the Richter scale. Richter scale is not linear in nature.

Seismograph: The tremors produce waves on the surface of the earth called seismic waves. The waves are recorded by an instrument called the seismograph.



Protections for earthquakes:

- If you are outdoors during an earthquake you must take care of the following precautions:

a. If you are in a car or a bus, do not come out. Ask the driver to drive slowly to a clear spot. Do not come out until the tremors stop.
b. Find a clear spot, away from buildings, trees and overhead power lines. Drop to the ground.

- If you are at home/school or office you must take care of the following precautions.

a. Take shelter under a table and stay there until shaking stops.
b. Stay away from tall and heavy objects that may fall on you.
c. If you are in bed, do not get up. Protect your head with a pillow.