Some Natural Phenomena

A Natural Phenomenon is anything that occurs on its own in nature without any kind of human intervention.

Electric Charges

- Every atom comprises of subatomic particles such as electrons, protons and neutrons.
- All these particles share a common property that they carry electric charges.
- Electrons have a negative charge on them while protons have a positive charge.
- We know that atoms carry a balanced charge however these charges may sometimes become out of order.
- An object will be called electrically neutral if it is carrying a balanced proportion of positive and negative charges.
- An object is called a charged object if there is an imbalance of electrons and protons in it.

Types of charges and their interaction

- We know that charged objects may have a shortage or excess of electrons.
- Objects having an excess of electrons are called negatively charged while an object having a shortage of electrons are called positively charged.
- For instance, when a glass rod is rubbed with silk cloth it becomes positively charged while the silk cloth becomes negatively charged.
- These charged objects are now capable of attracting other charged and uncharged objects.
- Objects having the same kind of charges repel each other while objects with different kind of charges attract each other.

Electrostatic force

The force of attraction or repulsion experienced by charged objects is called electrostatic force.

Static charge or static electricity is an electric charge which does not move. Static charges are a result when two objects are rubbed with each other. When two surfaces come in contact

with each other repeatedly it results in the transfer of electrons from one material to another. The strength of an electric charge depends upon different factors such as:

(i) The temperature and humidity

(II) Properties of the surface such as its material

In opposite to static charge, there is an electric current. The electric current results when the charges flow or move from one point to another. This electric current results in glowing of bulb or working of all the electrical appliances.

Transfer of charges

Charging by rubbing

When we rub two objects with each other they get charged due to a transfer of electrons between them.

For example, if we rub a rubber balloon with animal fur, the balloon is made up of rubber attracts the electrons from the animal fur.

This results in rubber having an excess of electrons while fur having a shortage of electrons.

In the same way, if we rub a plastic comb with dry hair the comb acquires some charge.

Conduction: when a charged object comes in contact with a conductor it results in the transfer of charges through the conductor.

Induction: When a charged object is brought near a neutral object, it results in shifting in the position of the electrons in the other object.

The process of induction does not involve any physical contact between the charged and uncharged object while the process of conduction requires a physical contact between them.

Frictional order :-

Wool
Flannel
Fur
Sealing wax
Glass
Paper
Silk
Hand

Rubber
Amber
Ebonite
Plastic

When any of these materials are rubbed together, the one in the higher order gets positive charge(+) and the one in the lower order gets negative charge (-)

A glass rod rubbed with silk gets positive charge (+)

An ebonite rod rubbed with fur gets negative charge (-)

Electroscope

It is a device which can test if an object is charged or not. Abraham Bennet developed a gold leaf electroscope in 1787.

Structure of an electroscope

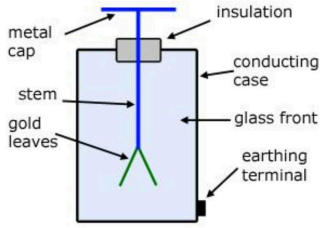
Generally, gold and silver are used to construct an electroscope because they are good conductors of electricity. Otherwise, copper and aluminium can also be used.

It consists of a glass jar having a vertical brass rod.

The rod is inserted into the jar through the cork.

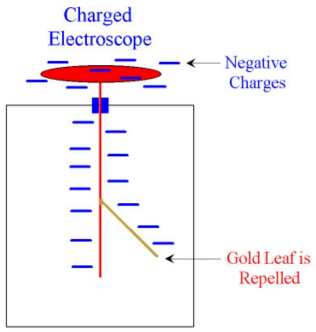
The brass rod has a brass disc or horizontal rod attached to it.

From the other end, two leaves of gold are suspended.



Working of an electroscope

When a charged object touches the brass disc, electric charges get transferred from the brass rod to the gold leaves. As a result, the gold leaves move away from each other depicting the presence of charges.



Discharging and Earthing

When a charged object loses its charges it is said to be discharged.

When a charged object transfers its charges to the earth it is called earthing. Generally, every building is provided with earthing to protect it from electrical shocks due to leakage of electric current.

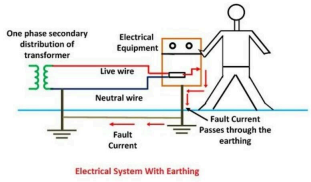


Figure 14 How Earthing Protects us form Shock