Chapter- 15 Some Natural Phenomena

Lightning The Story of Lightning Lightning Safety Earthquakes



Lightning

Lighting is the large electrical spark that usually occurs during thunderstorm. During thunder storm air currents move up while water droplets move down at very high speed.

The Sparks that the Greeks Knew About

Around 600 B.C. Greek people have observed that if they rub a resin "Amber" with the animal fur, it can attract their hair because of the electric charges developed by rubbing.



Lightning

In 1972, Sir Benjamin Franklin proved that the spark of our hair rubbing with woolen clothes and that of Lighting are both same!

Charging by rubbing

Activity

Take a plastic ruler and some small paper pieces. Rub it with your dry hair. Now bring the ruler close to the paper pieces without touching them. We see that the paper pieces getting attracted towards the rubbed ruler. It is because as we rub two objects vigorously we actually charge them.

The charges acquired by rubbing are static charges. They do not move. When charges move, it is electric current.

Electric current is the motion of charges through a conductor.

Types of Charges and their Interaction

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

Two charged bodies may attract or repel each other.

Like (similar) charges repel each other and unlike (dissimilar) charges attract each other.







Like charges repel each other

Inflate two balloons and hang them in such a way that they do not touch each other. Rub both the balloons with a piece of woollen cloth and release them. They repel each other.

Unlike charges attract each other

Charge a plastic refill by rubbing with polythene and keep it in a glass tumbler. Charge an inflated balloon by rubbing with a piece of woolen cloth and bring it near the charged plastic refill. They attract each other.



Transfer of Charge

Static electric charges can be transferred using a metal conductor.

A device used to test whether an object is carrying charge or not is known as an electroscope. It is also used to detect charges. If foils move away then body is charged and if foils remain at the same position then body touched with the wire is not charged.

The process of transferring charges of a charged body to the ground or earth is called earthing.



The Story of Lightning

When wind and droplets rub with each other they get charged. This causes the cloud to acquire electrical charge.

The upper part of cloud acquires positively charges and lower part of cloud acquires negative charges.



Accumulation of charges leading to lightning

There is accumulation of positive charges near the ground fall. As time passes, the accumulation of charges keep increase, at one point time, the accumulation of charges so high that air cannot restrict the charges through it.

It is at this point, charges carried by cloud discharged to the ground through the flash. This flash is called lighting.



Lightning Safety

Hearing thunder is an alert to rush to a safer place.

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

Open vehicles, like motorbikes, tractors, construction machinery and open cars are not safe. Open fields, tall trees, shelters in parks, elevated places do not protect us from lightning strokes. Carrying umbrella is not a good idea at all during thunderstorms. If in a forest, we should take shelter under shorter trees. If no shelter is available and we are in an open field, stay far away from all trees. We should stay away from poles or other metal objects. We should not lie on the ground. Instead, we should squat low on the ground.

Inside the House: Lightning can strike telephone cords, electrical wires and metal pipes. During a thunderstorm contact with these should be avoided. It is safer to use mobile phones and cordless phones. Bathing should be avoided during thunderstorms to avoid contact with running water. Electrical appliances like computers, TVs, etc., should be unplugged. Electrical lights can remain on. They do not cause any harm.

Lightning Conductors: Lightning Conductor is a device used to protect buildings from the effect of lightning. A metallic rod, taller than the building, is installed in the walls of the building during its construction. One end of the rod is kept out in the air and the other is buried deep in the ground. The rod provides easy route for the transfer of electric charge to the ground. The metal columns used during construction, electrical wires and water pipes in the buildings also protect us to an extent. But do not touch them during a thunderstorm.



Earthquakes

An earthquake is a sudden shaking or trembling of the earth lasting for a very short time. It is caused by a disturbance deep inside the earth's crust. Earthquakes occur all the time, all over the earth. They are not even noticed. Major earthquakes are much less frequent. They can cause immense damage to buildings, bridges, dams and people. There can be a great loss to life and property. The earthquakes can cause floods, landslides and tsunamis.

Causes of Earthquake

The outermost layer of the earth is not in one piece. It is fragmented. Each fragment is called a tectonic plate. These plates are in continual motion. When they brush past one another, or a plate goes under another due to collision, they cause disturbance in the earth's crust. It is this disturbance that shows up as an earthquake on the surface of the earth.

Tremors on the earth can also be caused when a volcano erupts, or a meteor hits the earth, or an underground nuclear explosion is carried out. However, most earthquakes are caused by the movement of earth's plates.



Movement of earth plate during earthquake

Since earthquakes are caused by the movement of plates, the boundaries of the plates are the weak zones where earthquakes are more likely to occur. The weak zones are also known as seismic or fault zones. In India, the areas most threatened are Kashmir, Western and Central Himalayas, the whole of North East, Rann of Kutch, Rajasthan and the Indo - Gangetic Plane. Some areas of South India also fall in the danger zone.

Seismograph

The tremors produce waves on the surface of the earth. These are called seismic waves. The waves are recorded by an instrument called the **seismograph**. The instrument is simply a vibrating rod, or a pendulum, which starts vibrating when tremors occur. A pen is attached to the vibrating system. The pen records the seismic waves on a paper which moves under it.



Protection against Earthquakes

It is, important that we take necessary precautions to protect ourselves all the time. People living in seismic zones, where the earthquakes are more likely to occur, have to be specially prepared. First of all, the buildings in these zones should be designed so that they can withstand major tremors. Modern building technology can make it possible. It is advisable to make the structure simple so that it is 'Quake Safe'.

• Consult qualified architects and structural engineers. In highly seismic areas, the use of mud or timber is better than the heavy construction material. Keep roofs as light as possible. In case the structure falls, the damage will not be heavy.

• It is better if the cupboards and shelves are fixed to the walls, so that they do not fall easily.

• Be careful where you hang wall clocks, photo-frames, water heaters etc., so that in the event of an earthquake, they do not fall on people.

• Since some buildings may catch fire due to an earthquake, it is necessary that all buildings, especially tall buildings, have fire fighting equipment in working order.

