Some Natural Phenomena 15

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INTRODUCTION

God has created the whole world. He has also created various type of animals, creatures, human beings, plant kingdom etc. on the earth. According to geographical conditions mountains, rocks, planes, rivers, seas and desert came into existence. Winds, storms, cyclones, earthquakes, floods, droughts etc. are natural phenomena. These phenomena cause destruction. Human being has no role in these phenomena. Occurring of day-night eclipses of sun and moon, etc. are the phenomena beyond the imagination of human beings. The damage and destruction caused by storms and cyclones to the mankind and other living organism is beyond our imaginations. If we think about to minimize the destruction but human is unable to control it. Sometimes rainfall is so much excessive that it affects the whole life of people and animals very adversely. A large number of people lose their homes. Animals, birds etc. either sink into the water or flown away in floods. The food items are not available in such situations. All the world is disturbed by such calamities. Government and common people extend their helps in providing food items, clothes, medicines, shelters etc. to flood-affected people.

Lightning

In ancient times, people were afraid of sparks. They thought in their hearts that anger of gods is the cause of thundering in the clouds. With the development of inventions/discoveries in science this misunderstanding of humans was removed. Now we know that the lightning and thunder is caused by the accumulation of charges in the clouds. We should take precautions to protect ourselves from it. Wire are fixed on electric poles situated along road side. When wires become loose, on blowing wind the wires get shaked consequently the wires come in

contact of each other and sparks are seen on a electric pole. Sometimes these wire get broken and fall down. If the wire fall in the water the current flows in the water, which may cause loss of life of a person or animal, which may come in contact of water. Similarly lightning is also an electric spark.

The Sparks that Greeks knew About them

Even before 600 B.C. the ancient Greeks new that when amber (a special type of resin) is rubbed with fur, it attracts light objects like hair towards it. When you take off woollen or polyester clothes, then a sound of cracking is produced. It is a characteristic of electricity.

In 1752, an American scientist Benjamin Franklin showed, through the experiment made by him, that definitely lightning and spark from your cloth are the same phenomena. However, it took 2000 years to relies this fact.

Activity Time

Wash your hair well using soap and make them quite dry. Now comb your hair. You will hear a cracking sound (chat-chat). Now if this comb is brought near to small pieces of paper, they are attracted by the comb. It shows that rubbing generate the charge. When plastic refill is rubbed with polythene and then it is brought near to dry small leaves. We see that leaves stick to the rubbed refill. It is because refill acquires charge. It is also charging by rubbing.

Types of Charges and their Interaction

Take two balloons, inflate them. Now hang the two balloons keeping a little distance between them so that they may not touch each other. Rub both the balloons with some woollen cloth and release them free for a while. You will see the balloon gets attracted towards the woollen cloth. It proves that woollen cloth attracts the balloons towards it, therefore it has charge and capacity to attract. On the other hand, both the balloons repel each other.

Thus, we can say that a charged balloon, rebelled a charged balloon. A charged refill repelled a charged refill. But a charged balloon attracted a charged refill. It is obvious that the charge on the balloon is different to the charge on the refill.

Hence we can say that there are two kinds of charges :

(i) positive (ii) negative.

The charges of the same kind (like charges)repel each other; whereas the charge, of different kind (opposite or alike charges) attract each other.

When a glass rod is rubbed with silk, then the charge acquired by the glass rod is called positive and that acquired by the silk is called negative. We see that when a charged glass rod is brought

near a charged plastic straw (refill) rubbed with polythene, there is a attraction between the two. Thus, plastic straw has negative charge. The charges generated by rubbing are static. They do not move by themselves. When charges move, an electric current is constituted. The electrical current, flowing a circuit, which makes a bulb glow or the wire gets heated is nothing else but is the flow (motion) of the charges.

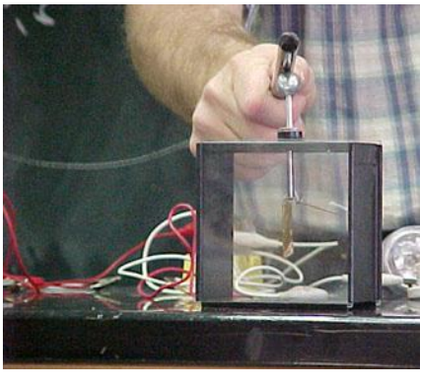
Transfer of Charge

Transfer of electricity means to send the electric charge from one object into the other object. As sending electricity from one wire into another wire. The electricity reaches in houses from the transfer by this process.

Do You Know ?

Charging a neutral object by bringing it in contact with another charged body is called charging by conduction.

Let us do and Learn



Take an empty bottle of jam and a piece of cardboard in size, some larger than the mouth of bottle. Make a hole in the piece of card board in which a paper clip can be inserted. Now open out the paper clip as shown in the figure. Cut two strip of aluminium foil of size 4 cm × 1cm each. Hang these strips on the paper clip as shown in the figure. Insert the paper clip in lid of cardboard in such away that it remains perpendicular to the cardboard. Charge the refill and touch it with the end of paper clip. Observe what happens. Is there only effect on the strips of foil? Do they repel each other or attract? Now make the other charged objects touch the clip end. Do the strips of foil behave in the same manner every time? Can this device be used to each whether a particular object is charged or not? Can you explain why the strips of foil repel each other? The aluminium foil strips receive the same charge as that on the charged refill, through the paper clip. The strips having similar (like) charge repel each other and they become wide open. Thus, this device can be used to check whether a given object is charged or not. This device is called an electroscope.

Thus, we have come to know that electrical charge can be transferred from a charged object to another object through a metallic conductor.

Touch the end of the paperclip tenderly. As soon as you do so, you will find a change in the foil strips. They come back to their original position. Repeat the process of charging of foil strips and touching the paper clip. Every time you will find the foil strips collapse as soon as you touch the paper clip with hand. It is due to the reason, on touching the strips, the charge on the foot strips goes to the earth passing through our body. Then we say that the foil strips are discharged. The process of transferring of charge from a charged object to the earth is called earthing.

The Story of Lightning

The science has proved that during the formation of thunder storms the waterdrops move downwards whereas water currents move upward. Due to this vigorous movement separation charges takes place. The positive charge collect near the upper edges of the clouds and the negative

charge collect near the lower edges. Positive charges also collect near the earth. When the magnitude of the accumulated charges becomes very charge, the air, being a poor conductor of electricity, is no longer able to hold their flow. Therefore negative and positive charges meet in the sky. The streaks of bright light and sound is produced. We see these streaks as lightning. This process is called an electric discharge.

The process of electric discharge may occur between two or more clouds or between clouds and the earth. Scientist are working hard to increase our knowledge. Lightning strike can destroy life and property. Therefore it is necessary to take measures to protect ourselves.

Safety from Lightning

We should be careful about the changes in nature and natural calamities. No open place is safe during lightning and thunder storms, even then we should take some safety measures. We should rush to a safer place as soon as the thunder is heard. We should wait for some time before coming out of the safe place, after hearing the last thunders.

Finding of a Safe Place

Though no place is safe during lightning and thunderstorm because lightning can strike at any place or show its effect.

You are travelling, taking food, taking rest, closing doors and windows at any time, after following many safety measure the lightning can strike and leave its effects. Even then you should stay inside the house with windows and doors shut.

Do's and Don'ts during a Lightning or Thunderstorm

We often see that people stay with motor bikes, tractors, construction machinery, open car, open fields and open, places parks etc. during lightning or thunder storm but these are not safe for shelter. These do not protect us from lightning strokes. Walking with an umbrella in an open place during lightning thunder storm may prove harmful. While you are walking, it is not safe for you to stay under a tree. Lying on the ground is not safe.

Squat low on the ground place your hands on your knees and put your head between the hands. This position may be most safer for you. Electrical appliances and plugs must not be touched. Mobile phones and cordless phones must be used; but it should be bear in mind that we should not call such a person who is receiving our call through a corded phone. We should avoid bathing in open places like in river or swimming pool during thunder storm. Electrical appliances like computers, TV should be unplugged. Electric bulbs, tube light etc. can be used. It would cause any harm.

Lightning Conductors

Lightning conductor is a device, which is used to protect the buildings from the effect of lightning. At the time of construction of a building a metallic rod of length greater than the height of the

building is fixed with one of its walls. One end of this rod is left open in the air, the other end is buried in the earth at a sufficient depth below the surface. Metallic rod provides a easy path to flow the electric charge from the top of the rod to the earth i.e. for the process of earthing. The metal columns, used during construction, electrical wires and water pipes in the building also protect us to an extent. But these should not be touched during thunderstorm as they may carry current and the person touching them may have an electric shock. The animals must also be protected. The animals should not be tethered near the electric poles or electric wire. Because they may carry current which may harm the animals.

Do You Know ?

A flash of lightning appears to flicker because there are usually several bolts of lightning striking at almost the same time.

Earthquakes

An earthquake is a sudden shaking or trembling of the earth surface. The crust of the earth is composed of several big and small fragments. These fragments are called plates. These plates remain in continual motion. During their movement sometimes they collide with each other when they pass each other or diverge from each other. Due to collision massive waves are generated at a certain point. These waves cause disturbance in the earth crust. This disturbance is called earthquake. Earthquake is a natural phenomenon. Mankind has no control over it. This natural calamity affects the human life very adversely. Large buildings get ruined. The land areas may uplift or submerge. In the sea, earthquakes give rise to seismic sea waves called tsunamis. If lightning, cyclones or typhoon are also occurring at the time of earthquake. It causes hindrance in relief works and a large number of people die. A major earthquake occurred in India on 8 October, 2005 in Uri and Tangdher towns of North Kashmir. One another major earthquake occurred on 26 January, 2001 in Bhuj district of Gujarat. It caused damage to human life and property on a large scale, that cannot be imagined.

What is the Cause of Earthquake

Several type of mythical stories, have been told in the ancient time, regarding the cause of earthquake, such as trembling of earth; the earth is balanced on the horn of bull and due to shifting of earth by bull from one horn to the other; the earth is balanced by a cow and due to change of side of the cow. But the scientists have discovered that there are rocks called plate in the inner part of the earth. Due to friction or breaking of these plates cause disturbance deep down inside the upper layer of the earth. This disturbance is known as earthquake.

Scientists have given many reasons for earthquake such as–due to becoming the substance inside the earth, disturbance in the earth or some changes in the surface of the earth.

Now we know that the earthquake occurs due to disturbance caused in deep in the upper most layer of the earth. This layer of the earth is known as crust. This outer most layer of the earth is not in one piece. It is fragmented (i.e. divided in many pieces). Each fragment is called a plate. These plates are in continuous motion. During their motion when they brush past one another or

a plate, goes under the other due to collision a disturbance is caused in the earth's crust. This disturbance appears as an earthquake on the surface of the earth.

Though we know the definite cause of an earthquake, but it has not become possible to predict the time and place, of occurrence of next possible earthquake so that the people may get alert.

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. But most of the earthquakes are caused by the movement of earth's plates. The boundaries of the plates are weak zones. Here earthquakes are most likely to occur. These weak zones are also called seismic zones or fault zones. An earthquake may occur at any time at any part of the earth. It is also said that earthquakes occur all the times all over the earth. But most of these are not noticed. Though the duration of an earthquake is very short, even then it may cause flood, land slide and tsunamis. A major tsunami occurred on 26 December, 2004 in the Indian ocean. All the coastal areas around the ocean suffered huge losses due to this tsunami.

The most threatened area by earthquakes, in India are Kashmir, western and central Himalayas, the whole North-East, Rann of Kutch, Rajasthan and the Indo-Genetic plane. Some areas of south India also fall in the danger zone.

The Power of an Earthquake and its Measurement and Expression

The power of an earthquake is expressed in terms of magnitude on a scale. This scale is known as the Richter scale. The earthquakes which have magnitudes higher than 7 on the richter scale prove really destructive. Both the earthquakes occurred in Bhuj and Kashmir had magnitude greater than 7.5. The scientist can also measure the speed and area affected by the earthquake.

Protection Against Earthquake

Earthquake is a natural calamity which cannot be predicted. Even though it is very essential to protect ourselves all the times from an earthquake. In some areas like Japan, Java, Sumatra etc. earthquakes occur more frequently. These are coastal areas or are lands. The people here have to take more precautions. They build their houses from wood, since they can be reconstructed easily. The structures of buildings are kept simple.

We should take following Safety Measure to Protect from Earthquake

1. The building should be built after consulting from a competent architecture and construction engineer.
2. In the most earthquake affected areas, in building construction use of mud and timber should be preferred instead of heavy materials.
3. The almirahas etc. must be fixed to the wall, so that they do not fall easily.
4. Take precaution while hanging wall clocks, photo-frames, water geysers etc. along the wall, that do not fall on the people sitting there in the event of an earthquake.

5. Some buildings may catch fire due to an earthquake. So it is very necessary that all the buildings, especially tall building, have the fire fighting equipment in working order.
6. If you are at home when an earthquake occurs then, sit under a table, stay there till the earthquake ends.
7. If you are lying in the bed, remain lying and protect your head by covering it with a pillow or some other cloth.
8. If you are outdoor then. If you are in a car or bus, do not come out.
9. If you are walking, find a clear spot. It should be away from tall and heavy objects such as buildings, trees, poles, over head power line etc. which may fall upon you.
10. Lye on the open ground.

Know the Keywords :

Transfer of electricity : It means to send the electric charge from one object into the other object.
Lightning conductor : It is a device which is used to protect the buildings from the effect of lightning.
Earthquake : An earthquake is a sudden shaking or trembling of the earth surface.

Point to Remember

- The charge acquired by a glass rod, when rubbed with silk is called positive charge.
- Scientific suggestions are available to minimize the destruction caused by destructive natural phenomena.
- Sparks are produced when electric wires strike together.
- In 1752, an American scientist Benjamin Franklin showed lightning and the spark from your clothes are one and the same phenomena.
- When negative and positive charges meet, the streaks of bright light and sound are produced. We see these as lightning. This process is called an electric discharge.
- Tremors occur due to the disturbance deep down inside the uppermost layer of the earth.
- The boundaries of the earth plates, are weak zones which are also known as seismic or flat zones.
- The magnitude of destructive earthquakes is greater than 7 on the richter scale. The magnitude of both the earthquakes, occurred in Kashmir and Bhuj was greater than 7.5.
- The tremors, produce wave on the surface of the earth, which are called seismic waves.
- During the occurrence of earthquake place yourself away from tall and heavy objects.

EXERCISE TIME

A. Answer the following questions :

1. Suggest three measures to protect ourselves from lightning inside the home.
2. Suggest three measures to protect ourselves from lightning outside the home.
3. List three states in India where earthquakes are more likely to strike.
4. What precautions would you take to protect yourself against an earthquake out of the home?
5. What damages are caused by an earthquake?
6. Describe a lightning conductor.
7. Describe the thunder storm and lightning.
8. Write any essay on earthquake.
9. What precautions should be taken to reduce the damages caused by an earthquake?
10. Why should we never stand under a tree during thunder storm, lightning or earthquake?

B. Fill in the blanks :

1. Charge are of two types : (i) _____ (ii) _____
2. The disturbance deep down inside the earth's crust _____ are caused.
3. When the charges move they form _____.
4. Lightning conductor can _____ the buildings from the effect of lightning.
5. The like charges _____ each other and the unlike charges _____ each other.
6. Lightning strike can destroy life and _____.
7. The process of transferring of charge from a charged object to the earth is called _____.

C. Write 'T' for true and 'F' for false statement :

1. Earthquake means trembling of the earth. ( )
2. The copper is attracted towards the electrode connected from negative terminal of the cell. ( )
3. The magnitude of an earthquake is measured on a Richter scale. ( )
4. Charges are of three types. ( )
5. It is not possible to predict an earthquake. ( )
6. Repulsion between two bodies is a definite proof that both the bodies are charged. ( )

D. Tick (✓) the correct option :

1. The process of transferring of charge from a charged object to the earth is called :
   (i) earthquake ◯ (ii) discharge ◯
   (iii) volcanoerupts ◯ (iv) earthing ◯
2. When negative and positive charges meet, the streaks of bright light and sound are produced, which are seen by us as lighting. This process is called :
   (i) electric discharge ◯ (ii) charging ◯
   (iii) earthquake ◯ (iv) earthing ◯
3. A tsunami occurred in the Indian ocean on :
   (i) 26 December, 2004 ◯ (ii) 10 December, 2004 ◯
   (iii) 26th January, 2001 ◯ (iv) 8 October, 2005 ◯
4. The tremors are caused by the disturbance deep down inside the upper most layer of the earth. This layer is known as :
   (i) earth crust ◯ (ii) volcano ◯
   (iii) discharge ◯ (iv) fault zones ◯
5. Which of the following cannot be charged easily by friction?
   (i) a plastic scale ◯ (ii) an inflated balloon ◯
   (iii) a woollen cloth ◯ (iv) a copper rod ◯
6. When a glass rod is rubbed with a piece of silk cloth the rod :
   (i) becomes negative charged while the cloth acquires a positive charge ◯
   (ii) becomes positively charged while the cloth acquires a negative charge ◯
   (iii) and the cloth both acquire the negative charge ◯
   (iv) and the cloth acquire the positive charge ◯
7. The lower end of the rod of the lightning conductor is connected to :
   (i) electric pole ◯ (ii) copper plate ◯
   (iii) zinc plate ◯ (iv) building ◯
8. The intensity of earthquake is measured on :
   (i) Newton scale ◯ (ii) Metre scale ◯
   (iii) Richter scale ◯ (iv) Seismograph ◯

Creative Work

- **With the help of your teacher, write the measures taken for protection against earthquakes, on a chart paper.**