SCIENCE

CHARGES INTERACTION & TRANSFER

TYPES OF CHARGES AND THEIR INTERACTION

(a) Inflate two balloons. Hang them in such a way that they do not touch each other. Rub both the balloons with a woollen cloth and release them. What do you observe?

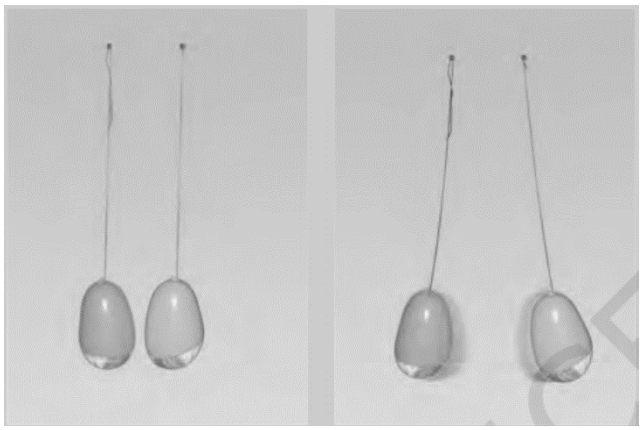

Fig. Like charges repel each other

Now let us repeat this activity with the used pen refills. Rub one refill with polythene. Place it carefully in a glass tumbler using the tumbler as a stand

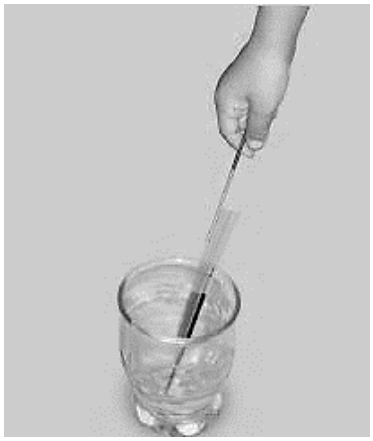

Fig. Interaction between like charges

Rub the other refill also with polythene. Bring it close to the charged refill. Be careful not touch the charged end with your hand. Is there any effect on the refill in the

tumbler? Do the two attract each other, or repel each other? In this activity we have brought close together the charged objects that were made of the same material. What happens if two charged objects made of different materials are brought close to each other? Let's find out.

(b) Rub a refill and place it gently in a glass tumbler as before. Bring an inflated charged balloon near the refill and observe.

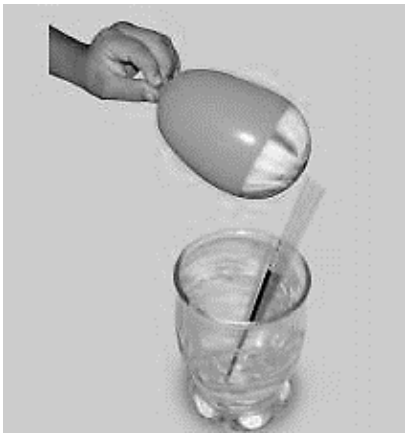

Fig. Unlike charges attract each other

Let's summarise the observations:

- A charged balloon repelled a charged balloon.
- A charged refill repelled a charged refill.
- But a charged balloon attracted a charged refill.

Does it indicate that the charge on the balloon is of a different kind from the charge on the refill? Can we say then, that there are two kinds of charges? Can we also say that the charges of the same kind repel each other, while charges of different kind attract each other?

It is a convention to call the charge acquired by a glass rod when it is rubbed with silk as positive. The other kind of charge is said to be negative.

It is observed that when a charged glass rod is brought near a charged plastic straw rubbed with polythene there is attraction between the two.

What do you think would be the kind of charge on the plastic straw? Your guess, that the plastic straw would carry a negative charge is correct.

The electrical charges generated by rubbing are static. They do not move by themselves. When charges move, they constitute an electric current. The current in a circuit which makes a bulb glow, or the current that makes a wire hot, is nothing but a motion of charges.

TRANSFER OF CHARGE

Take an empty jam bottle. Take a piece of cardboard slightly bigger in size than the mouth of the bottle. Pierce a hole in it so that a metal paper clip can be inserted. Cut two strips of aluminium foil about 4 cm × 1 cm each. Hang them on the paper clip as shown. Insert the paper clip in the cardboard lid so that it is perpendicular to it. Charge a refill and touch it with the end of the paper clip. Observe what happens. Is there any effect on the foil strips? Do they repel each other or attract each other? Now, touch other charged bodies with the end of the paper clip. Do foil strips behave in the same way in all cases? Can this apparatus be used to detect whether a body is charged or not? Can you explain why the foil strips repel each other?

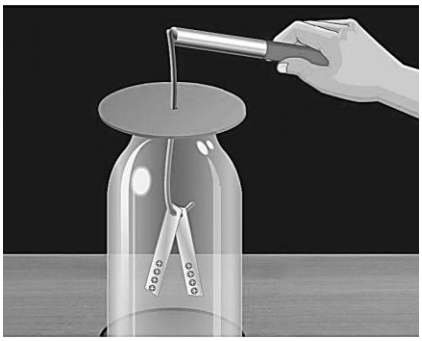

Fig. A simple electroscope

The aluminium foil strips receive the same charge from the charged refill through the paper clip (remember that metals are good conductors of electricity). The strips carrying similar charges repel each other and they become wide open. Such a device can be used to test whether an object is carrying charge or not. This device is known as electroscope.

Thus, we find that electrical charge can be transferred from a charged object to another through a metal conductor.

Touch the end of the paper clip gently with hand and you will find a change in the foil strips. They come back to their original state. Repeat charging of foil strips and touching the paper clip. Every time you will find that the foil strips collapse as soon as you touch the paperclip with hand. Why

does it happen? The reason is that the foil strips lose charge to the earth through your body. We say that the foil strips are discharged. The process of transferring of charge from a charged object to the earth is called earthing.

Earthing is provided in buildings to protect us from electrical shocks due to any leakage of electrical current.