

Lesson at a Glance

- The materials which allow electric current to pass through are called *good conductors of electricity*. For example, metals like copper and aluminium.
- The materials which do not allow electric current to pass through them easily are called poor conductor of electricity. For example, rubber, plastic and wood.
- Due to the *heating effect of current*, the filament of the bulb of the tester gets heated to a high temperature and it starts glowing.
- If the current through a circuit is too weak, the filament does not get heated sufficiently and it does not glow.
- **LED (Light Emitting Diodes)** can be used in place of the electric bulb in the tester. LED glows even when a weak electric current flows through it.
- As *electric current produces magnetic current*, a tester can be prepared by using a *compass needle*. The deflection of the magnetic needle can be seen, even when current is small.
- Distilled water is poor conductor of electricity. Water collected from taps, hand pumps, wells and ponds is not pure and contain dissolved salts so it is good conductor of electricity.
- Most liquids that conduct electricity are *solutions of acids, bases and salts*.
- **Chemical effect of the electric current:** The passage of an electric current through a conducting solution causes chemical reaction. That may cause formation of *bubbles of a gas on the electrodes, deposits of metal on electrodes, changes of colour of solutions etc.*
- **Electroplating:** The process of depositing a layer of any desired metal on another material by means of electricity is

called *electroplating*. It is one of the most *common application of chemical effects of electric current*.

- **Uses of Electroplating:** Electroplating is widely used in industry for coating metal objects with a thin layer of a different metal. This may be done to
 - make objects appear shiny,
 - prevent corrosion,
 - make objects resistant to scratches.
 - coat less reactive metal on more reactive metals to protect from getting spoilt,
 - electroplate less expensive metals with silver and gold to make ornaments.

For example:

- **Chromium** has a *shiny* appearance, does not corrode and is resistant to scratches. But, chromium is expensive and it is not economical to make the whole object out of chromium. So, the objects, such as taps, car parts, wheel rims etc. made from a cheaper metal and electroplated with chromium.
- Jewellery made of cheap metal is electroplated with silver or gold to appear as if made of silver or gold.
- *Tin is less reactive than iron*. So, iron cans used for food items are electroplated with *tin to prevent spoilage from contact with iron*.
- Iron used in bridges and automobiles is electroplated with a coating of *zinc* to protect it from *corrosion and formation of rust*.
- The disposal of the used conducting solution of electroplating factories is a major problem. It is a polluting waste and there are specific disposal guidelines to protect the environment.

TEXTBOOK QUESTIONS SOLVED

Q. 1. Fill in the blanks:

- (a) Most liquids that conduct electricity are solutions of _____, _____, and _____.

- (b) The passage of an electric current through a solution causes _____ effect.
- (c) If you pass current through copper sulphate solution, copper gets deposited on the plate connected to the _____ terminal of the battery.
- (d) The process of depositing a layer of any desired metal on another metallic object, by means of electricity, is called _____.

Ans. (a) acids, bases, salts
 (b) chemical
 (c) negative
 (d) electroplating.

Q. 2. When the free ends of a tester are dipped into a solution the magnetic needle shows deflection. Can you explain the reason?

Ans. Yes, we can explain the reason. The magnetic needle will show deflection when circuit is complete. The deflection of magnetic needle shows that the solution is a good conductor.

Q. 3. Name three liquids, which when tested in the manner shown in Fig. 14.1 may cause the magnetic needle to deflect?

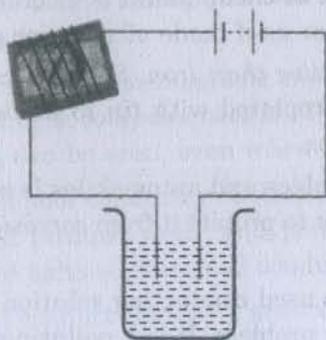


Fig. 14.1

Ans. Tap water, hydrochloric acid, sodium hydroxide.

Q. 4. The bulb does not glow in the set up shown in Fig. 14.2. List the possible reasons. Explain your answer.

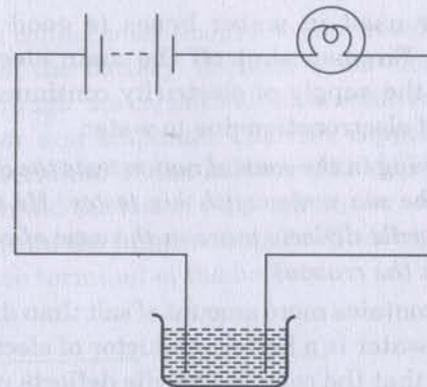


Fig. 14.2

Ans. The possible reasons may be:

- The connections of the circuit may be loose.
- Bulb may be fused.
- Cells may be used up.
- The liquid may be poor conductor.

Q. 5. A tester is used to check the conduction of electricity through two liquids, labelled A and B. It is found that the bulb of the tester glows brightly for liquid A while it glows very dimly for liquid B. You would conclude that:

- liquid A is a better conductor than liquid B.
- liquid B is a better conductor than liquid A.
- both liquids are equally conducting.
- conducting properties of liquid cannot be compared in this manner.

Ans. We conclude that option (i) 'liquid A is a better conductor than liquid B'.

Q. 6. Does pure water conduct electricity? If not what can we do to make it conducting?

Ans. No, the pure water does not conduct electricity. Pure water can be made conducting by dissolving salt in it.

Q. 7. In case of a fire before the firemen use the water hoses, they shut off the main electrical supply for the area. Explain why they do this.

Ans. The water used in water hoses is good conductor of electricity. Firemen shut off the main electrical supply, because if the supply of electricity continues this may be high risk of electrocution due to water.

Q. 8. A child staying in the coastal region tests the drinking water and also the sea water with his tester. He finds that the compass needle deflects more in the case of sea water. Can you explain the reason?

Ans. Sea water contains more amount of salt than drinking water. So the sea water is a better conductor of electricity. This is the reason that the compass needle deflects more in case of sea water.

Q. 9. Is it safe for the electrician to carry out electrical repairs outdoors during heavy down-pour? Explain.

Ans. No, It is not safe for the electrician to carry out electrical repairs during heavy downpour. It is because during heavy downpour there is a higher risk of electrocution.

Q. 10. Paheli had heard that rain water is as good as distilled water. So she collected some rain water in a clean glass tumbler and tested it using a tester. To her surprise she found that the compass needle showed deflection. What could be the reasons?

Ans. Rain water is like a distilled water but some impurities are mixed in from the atmosphere. These impurities make the rain water conducting. This could be the reason for the deflection of compass needle.

Q. 11. Prepare a list of objects around you that are electroplated.

Ans. Pots of metals, bath taps, ornaments, rims of vehicles, handle bar of cycles and motor cycles, kitchen gas burner, bottom of cooking utensils, handles of doors, tin cans are the some objects around us that are electroplated.

Q. 12. The process that you saw in Activity 14.7 is used for purification of copper. A thin plate of pure copper and a thick rod of impure copper are used as electrodes. Copper from impure rod is sought to be transferred to the thin copper plate. Which electrode should be attached to the positive terminal of the battery and why?

Ans. The rod of copper plate should be connected to the positive terminal of the battery. Because when electric current is passed through the copper sulphate solution, it dissociates into copper and sulphate. The free copper drawn to the negative terminal of the battery gets deposited on it. On the other hand the loss of copper from the solution would be regained from the impure copper rod which is connected to the positive terminal of the battery.

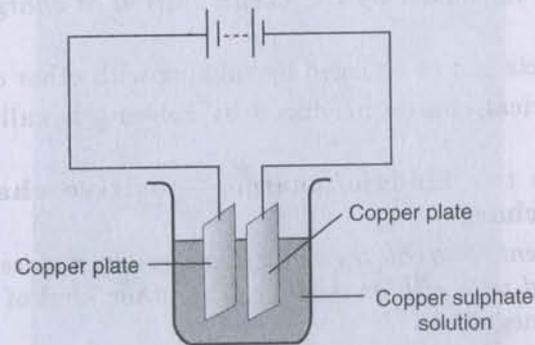


Fig. 14.3 A Simple circuit showing electroplating.