CHAPTER -11

CHEMICAL EFFECTS OF ELECTRIC CURRENT

EXERCISES

1 Mark Questions

Q1: When the free ends of a tester are dipped into a solution, the magnetic needle shows deflection. Can you explain the reason?

Answer: The deflection in magnetic needle shows that the circuit is complete and the solution conducts electricity, i.e., it is a good conductor

Q2: What are conductors?

Answer: Materials which allow electric current to flow through them are called conductors.

Q3: What are insulators?

Answer: Materials which do not allow electric current to flow through them are called insulators.

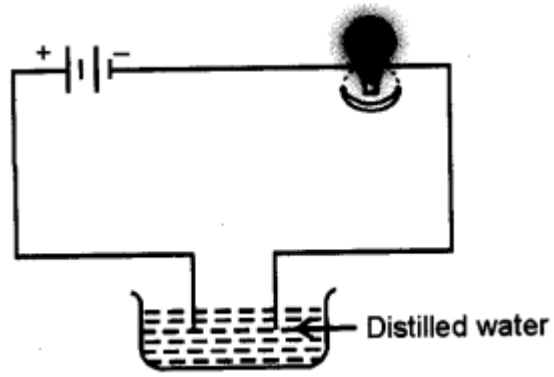
Q4: Classify the following liquids into conductors and insulators: lemon juice, distilled water, tap water, milk.

Answer: Conductors: lemon juice, tap water.
Insulators: distilled water, milk.

Q5: What is electrolysis?

Answer: Electrolysis is the breaking up of a compound from its solution on passing electric current through the electrolyte.

Q6: Jaya sets up a circuit as given below. But the bulb does not glow. Why?



Answer: The bulb does not glow because distilled water is an insulator, since it does not have dissolved salts.

Q7: What is CFL?

Answer: Compact Fluorescent Lamps

Q8: What is LED?

Answer: LED is Light Emitting Diode.

Q9: Deposits can be seen in containers uses for storing water. Explain why these deposits occur.

Answer: In containers, water evaporates slowly. The salts separate out and deposit on the sides of the container.

Q10: Is it safe for the electrician to carry out electrical repairs outdoors during heavy downpour? Explain.

Answer: No, it is not advisable for electrician to carry out electrical repairs during heavy downpour because water is a good conductor of electricity and the person can get shock.

2 Mark Questions

Q1: Does pure water conduct electricity? If not, what can we do to make it conduct?

Answer: Pure water does not conduct electricity, as it does not contain any type of salt. Adding a small amount of Common salt (Sodium Chloride, i.e., NaCl) will turn the water into a conducting medium.

Q2: 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.

Answer: In case of a fire, before the firemen use the water hoses, they shut off the main electrical supply for the area because water sprayed from the hose might conduct electricity which may come in contact with the electrical appliances, which increases the chance of electricity passing through the wire. This may hurt the firemen.

Q3: A child staying in a coastal region tests the drinking water and also seawater with his tester. He finds that the compass needle deflects more in the case of seawater. Can you explain the reason?

Answer: The amount of dissolved salts present in the seawater is more than that of the drinking water. So, seawater will be a better conductor than drinking water. That is the reason behind the increased deflection of the needle in the seawater when compared to the drinking water.

Q4: Is it safe for the electrician to carry out electrical repairs outdoors during heavy downpours? Explain.

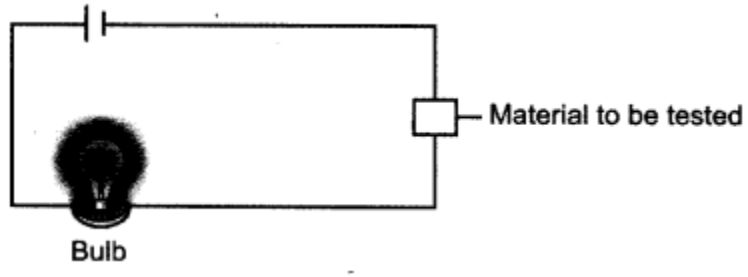
Answer: No. It is not safe to repair electrical appliances outdoors during heavy downpours. Rainwater is composed of a certain percentage of dissolved salts making it conductive. This may cause electric shocks and harm the electrician while working outdoors during heavy downpours.

Q5: Paheli had heard that rainwater is as good as distilled water. So she collected some rainwater 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?

Answer: Rainwater is composed of a certain percentage of dissolved salts making it conductive. This results in the deflection of the compass.

Q6: How can you make a tester for testing whether a given material is a conductor or an insulator?

Answer: A tester can be made by attaching one free end of the wire to a terminal of a battery and another wire from other terminal of the battery to a bulb. The two free ends of wire are connected to the material to be tested.



Q7: Explain the process of electroplating of copper.

Answer: When electric current is passed through copper sulphate solution, the copper sulphate breaks up into copper and sulphate ions. The free copper gets drawn to the plate connected to the negative terminal of the battery and gets deposited on that plate. From the other plate, an equal amount of copper gets dissolved in the solution. The loss of copper from solution is cqmpensated and the process goes on.

5 Mark Questions

Q1: Name three liquids, which when tested in the manner shown in Fig.14.9, may cause the magnetic needle to deflect.

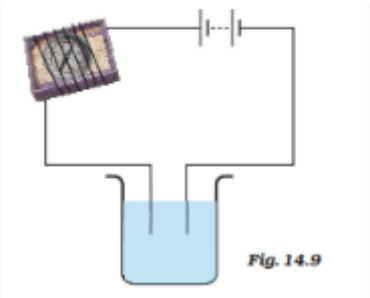


Fig. 14.9

Answer:

I. Saltwater

II. Lemon juice

III. Vegetable oil

These liquids can be taken in a beaker to show the passage of electricity, as they will show a deflection in the magnetic needle.

Q2: The bulb does not glow in the setup shown in Fig.14.10. List the possible reasons. Explain your answer.

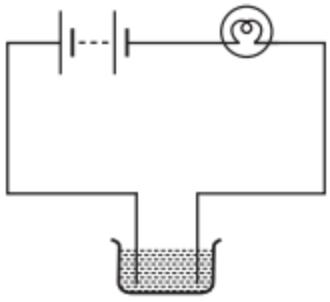


Fig. 14.10

Answer: The possibility of the bulb not glowing may be because of the following reasons:

a. The liquid may be non-conducting. In this case, the circuit is incomplete, and the current does not pass through the liquid.

b. Electric current may be weak for the circuit is made up of a material which is not a good conductor of electricity, or there is insufficient energy in the battery to generate electricity.

, gets drawn to the negative terminal of the battery and gets deposited on it. On **Q3: Prepare a list of objects around you that are electroplated.**

Answer: Chromium plating: This is done on exterior parts of automobiles in order to obtain a shiny appearance.

Gold Plating: Silver ornaments are coated with a thin layer of gold, and the product is called Gold-plated Ornaments.

Zinc Plating: Iron used for Construction is coated with a Zinc layer in order to protect them from corrosion and rusting.

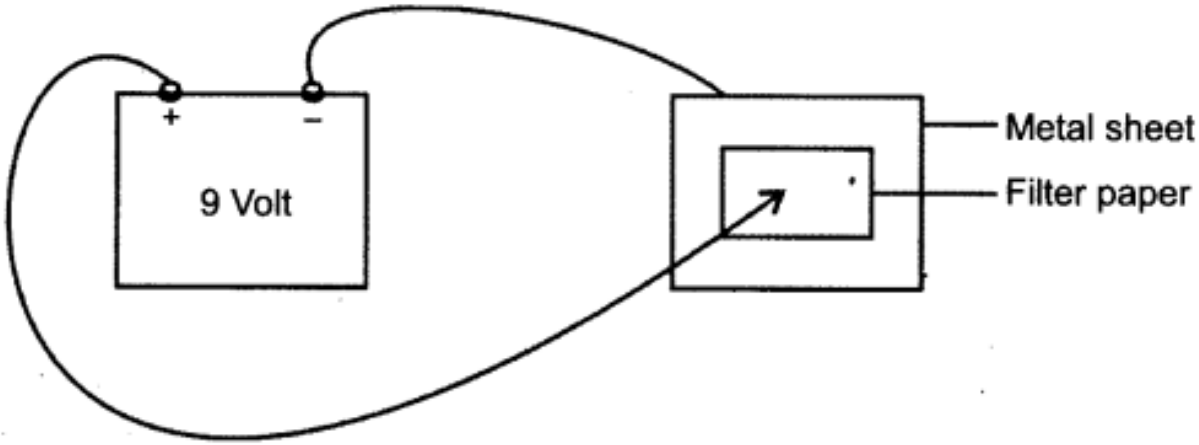
Q4: The process that you saw in Activity 14.7 is used for the purification of copper. A thin plate of pure copper and a thick rod of impure copper are used as electrodes. Copper from the impure rod is sought to be transferred to the thin copper plate. Which electrode should be attached to the positive terminal of the battery and why?

Answer: The thick rod of the impure copper plate is to be attached to the positive terminal of the battery because when the electric current is passed through the copper sulphate solution, it gets dissociated into copper and sulphate. The free copper, being positively charged the other hand, the loss of copper from the solution is regained from the impure copper rod, which is attached to the positive terminal of the battery.

Q5: What is the basic principle of electric pen? Explain how it can be used for writing.

Answer: Electric charge on ions is used for writing with an electric pen.
Method:

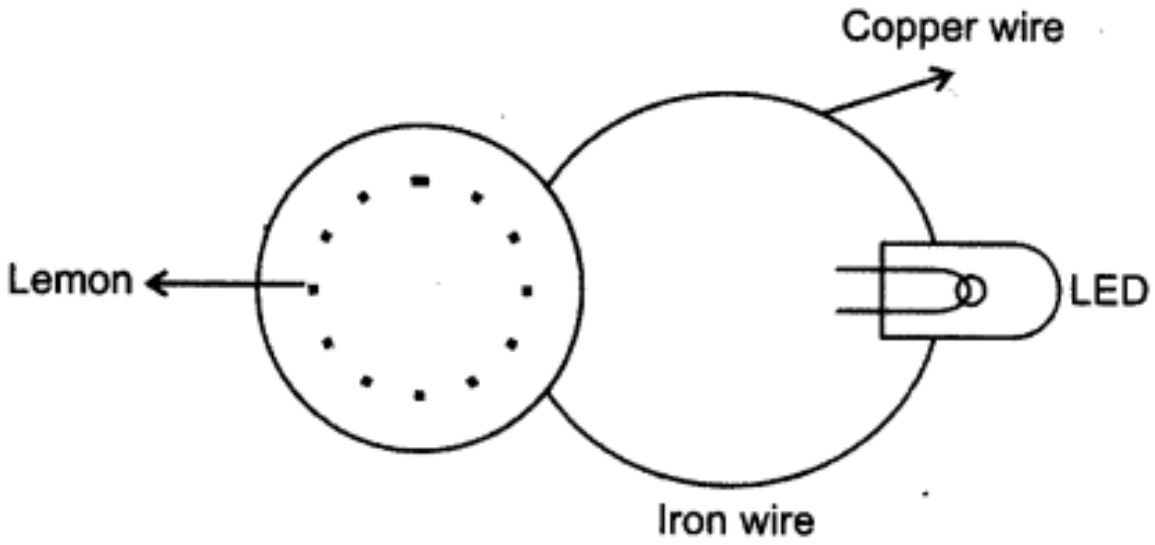
- Take a filter paper soaked in potassium iodide solution to which a pinch of starch is added.
- Place the filter paper on a metal sheet.
- Connect the negative terminal of battery to the metal sheet.
- Write on the paper with the end of the wire connected to the positive terminal.



- The writing appears on the paper. This happens because the when current is passed, the K+ ions are attracted to the metal sheet. The iodide ions (I-) react with starch to turn blue black.

Q6: Dinesh is wants to study the chemical effect of current at home. How can he do it?

Answer: Dinesh can study the chemical effect of current at home very easily. Take two pieces of copper wire and iron wire. Place them in fresh lemon fruit. Attach the free ends of the wires to a LED. LED glows showing the flow of current.



Q7: Give some uses of LED. How should LED be connected?

Answer:

- as indicators in electrical appliances.
- as a point source of light in laser beam torches.
- LEDs emitting white light can be used instead of bulbs.

The longer lead (leg) from the LED should be connected to the positive terminal of the battery and the shorter lead to the negative terminal of the battery.

Fill in the blank

1. Most liquids that conduct electricity are solutions of _____, _____ and _____

Answer: acids, bases, salts

2. The passage of an electric current through a solution causes _____ effects.

Answer: chemical

3. If you pass current through copper sulphate solution, copper gets deposited on the plate connected to the _____ terminal of the battery.

Answer: negative

4. The process of depositing a layer of any desired metal on another material by means of electricity is called _____

Answer: electroplating

5. An electric bulbs glows due to _____ effect of current.

Answer: Heating

6. The object to be electroplated is taken as _____ electrode.

Answer: cathode

7. Distilled water is ____ conductor of electrify while tap water is _____ conductor of electrify

Answer: poor, good

8._____ discovers the electrolysis of water

Answer: William Nicholson

Multiple Choice Questions

1. The decomposition of an electrolyte when electricity is passed through it, is called

(a) conduction
(b) coating
(c) electrolysis
(d) electro refining

Answer: (c) electrolysis

2. Which out of the following does not conduct electricity?

(a) Copper
(b) Alcohol
(c) Dilute sulphuric acid
(d) Vinegar

Answer: (b) Alcohol

3. The electrode, connected to the positive terminal of a battery, is called

(a) anode
(b) pole
(c) cathode
(d) photodiode

Answer: (a) anode

4. A metal is released in the electrolysis of a salt. It gets deposited on the

(a) anode
(b) cathode
(c) half on the anode and half on the cathode
(d) sides of the container

Answer: (b) cathode

5. Distilled water is a
(a) conductor
(b) insulator
(c) semi-conductor
(d) semi-insulator

Answer: (b) insulator

6. A cell is an example of conversion of
(a) magnetic energy into chemical energy
(b) electrical energy into chemical energy
(c) chemical energy into electrical energy
(d) chemical energy into magnetic energy

Answer: (c) chemical energy into electrical energy

7. Which one of the following is a weak electrolyte?
(a) Sea water
(b) Oxalic acid
(c) Sodium chloride
(d) Nitric acid

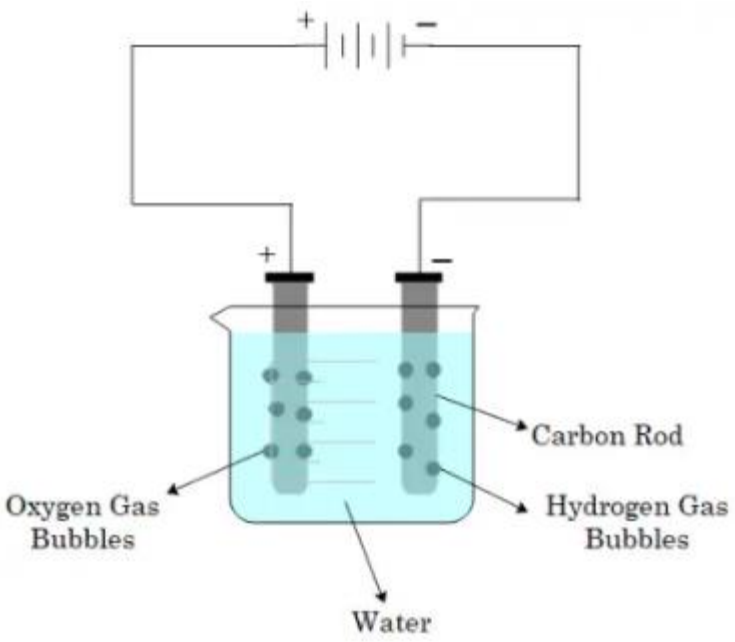
Answer: (b) Oxalic acid

8. Which of the following metal is not extracted by electrolysis?
(a) Aluminum
(b) Iron
(c) Sodium
(d) Potassium

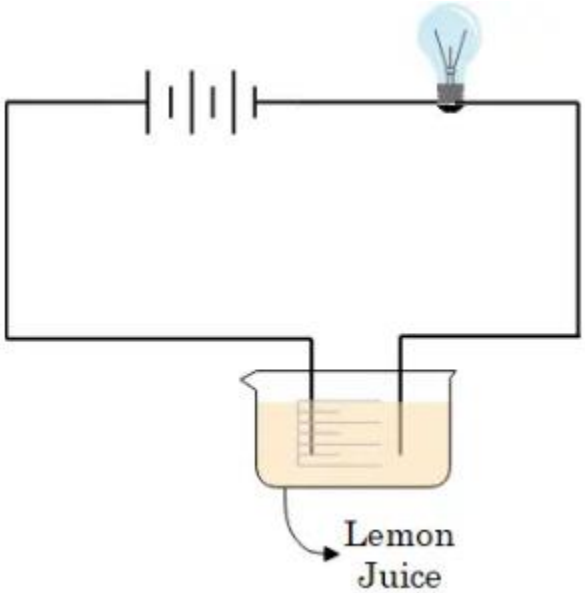
Answer: (b) Iron

DIAGRAMS:

Release of bubbles when current passes through liquid



Liquid conduct electricity



SUMMARY

- Metals are considered a good conductor of electricity due to the flow of electric charges in them
- The majority of liquids that conduct electricity are salt, acid, and base solutions.
- Due to the lack of free electrons or ions needed to transmit electricity, oil, gasoline, and kerosene are poor electrical conductors.
- Chemical reactions occur when an electric current flows through a conducting liquid. Chemical impacts of currents are the ensuing effects.
- The liquids that permit the passage of an electric current and split as the current passes through them are known as electrolytes.
- When an electric current is sent across ionic compounds, they undergo the process of electrolysis, which breaks them down into simpler substances.
- Electroplating is the electrical method of depositing a layer of any desired metal on another material.