



INDIAN SCHOOL AL WADI AL KABIR



Class: VIII	DEPARTMENT: SCIENCE-2022-2023	DATE:31/01/2023
WORKSHEET NO. 17 WITH ANSWERS	TOPIC: CHEMICAL EFFECTS OF ELECTRIC CURRENT	NOTE: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

**I. VERY SHORT ANSWER (1M):**

1. What is electroplating?  
[The process of depositing a layer of any desired metal on another material by means of electricity is called electroplating.]
2. Why do most liquids conduct electricity?  
[Due to the presence of ions or dissolved salts in them, most liquids conduct electricity.]
3. An LED is a more efficient device than a bulb. Why?  
[Light Emitting Diode is more efficient because it can glow even when a weak or less current flows through it.]
4. What makes distilled water a good conductor?  
[Salts when mixed with distilled water make it a good conductor.]
5. Why is a layer of zinc coated over iron? [To prevent iron from corrosion and rust.]
6. What precaution is taken in regard to the cell, while checking the tester? Why?  
[While checking the tester, one must not join its free ends for more than a few seconds. Otherwise, the cells of the battery will drain very quickly.]
7. Why do we infuse chromium electroplating on taps and bars of bicycles instead of silver and gold?  
[Silver and gold are very expensive compared to chromium.]
8. Current does not flow in a circuit if there is a gap between the two wires. Does it indicate that air is a poor conductor of electricity? Does air never conduct electricity? Explain.  
[Air is a poor conductor of electricity if it is dry but in certain cases like during lightning and when air is moist, air may conduct electricity.]
9. What are electrodes?  
[A solid conductor through which electricity enters or leaves a substance.]

10. Write two applications of the chemical effect of electric current.

[Two common applications of the chemical effect of electric current are:

i). electroplating of metals ii). Purification of metals]

**For question numbers 11 to 13, two statements are given- one labelled Assertion (A) and the other labelled Reason (R).**

**Select the correct answer to these questions from the codes (i), (ii), (iii) and (iv) as given below**

**i) Both A and R are true and R is the correct explanation of the assertion.**

**ii) Both A and R are true but R is not the correct explanation of the assertion.**

**iii) A is true but R is false.**

**iv) A is false but R is true**

**Assertion (A):** The presence of chemicals and impurities makes rainwater a good conductor of electricity.

**Reason (R):** When water falls down as rain drops, many impurities dissolve in it which makes it a good conductor.

(i) Both A and R are true and R is the correct explanation of the assertion.

11. **Assertion (A):** Tin cans, used for storing food are made by electroplating tin onto the iron.

**Reason (R):** Chromium has a shiny appearance and does not corrode and resists scratches.

(ii) Both A and R are true but R is not the correct explanation of the assertion.

12. **Assertion (A):** Water can be decomposed into hydrogen and oxygen by heating to a very high temperature.

**Reason(R):** The chemical effects of electric current are used to decompose various chemical compounds into their elements.

(iv) A is false but R is true.

## II. **a) PASSAGE BASED :**

**Read the following passage and answer the questions**

William Nicolson, a British chemist proved by his experiments that when an electric current is passed through certain liquids or solutions that conduct electricity, chemical changes occur. This is called the chemical effect of electric current. The chemical decomposition of a liquid or solution while passing an electric current is called electrolysis. The liquid or solution that breaks up during electrolysis is called an electrolyte. He proved that if electrodes connected to terminals of a battery were immersed in water and the current was passed through the water, bubbles of oxygen and hydrogen were produced. Oxygen bubbles were produced on the electrode which was connected to the positive terminal of the battery

and hydrogen bubbles were produced on the electrode connected to the negative terminal of the battery. The electrode which is connected to the negative terminal of the battery is called the cathode, and the electrode connected to the positive terminal is called the anode.

Using the same information, Sandhya and Shilpa performed an experiment to show that water can conduct electricity. Shilpa fixed a zero-watt bulb in the circuit, but Sandhya told her to use LED as it glows even in low voltage. They used distilled water to test the conductivity but no current passed through the circuit. Sandhya decided to add an ingredient to convert distilled water into a conducting solution.

- i) Distilled water does not conduct electricity. What substances can be added to distilled water in small amounts to make it a good conductor of electricity? Why?

Ans: When salt is dissolved in distilled water we get a salt solution. Thus, distilled water becomes a good conductor of electricity by dissolving a little salt in it. Distilled water is a poor conductor of electricity because it does not contain any dissolved salts in it.

- ii) Formation of gas bubbles can be observed when an electric current is passed through an electrode which is immersed in a conducting solution. Which type of effect causes the formation of gas bubbles?

Ans: Chemical effect

- iii) What are electrodes? Which Electrode is connected to the negative terminal of the battery?

Ans: Electrodes — They allow the electric current to enter or leave the electrolytic solution. The electrodes are two in number and are made of metal or carbon.

Cathode

- iv) What do you mean by electrolysis of water?

Ans: Electrolysis of water is **the process by which water is split into hydrogen and oxygen by the application of electrical energy**. The water electrolysis principle is the passage of a direct current between two electrodes immersed in an electrolyte.

- v) Which of the following statements is incorrect about the conductivity of water?

- a) Rainwater is a good conductor of electricity
- b) On addition to table salt, water conducts electricity
- c) On addition to lemon juice, water conducts electricity
- d) Water becomes a good conductor of electricity when heated

## II. b) CASE STUDY-BASED PASSAGE

Sita and her mother reached a jewellery shop to purchase some ornaments. She liked a necklace very much but her mother told her not to purchase it because it is not real gold. When she checked the information tag, it was written that 1gm gold. The necklace was quite big and heavy. She was surprised to see it and asked about it. The salesman explained that it

is a gold-plated necklace. Then Sita checked that 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 applications of the chemical effects of electric current. Nowadays, people prefer to buy gold-plated jewellery, similarly, iron articles are often coated with zinc or chromium to protect them from rusting and corrosion.

In electroplating factories, the disposal of the used conducting solution is a major concern. It is a polluting waste and specific disposal guidelines should be followed to protect the environment

i) **Where and how the electroplating waste should be disposed of?**

Ans: In an electroplating factory, the disposal of the used conducting solution is a major concern because it is a polluting waste, therefore it should be disposed of **according to the disposal guidelines of the local authority.**

ii) **What are the effects produced by the chemical reactions brought about by an electric current?**

Ans: The passage of an electric current through a conducting solution causes chemical reactions. As a result, **bubbles of a gas may be formed on the electrodes. Deposits of metal may be seen on electrodes. Changes in the colour of solutions may occur.**

iii) **Name the materials that can be used for electroplating.**

Ans: Common metals used in the electroplating process include **black and silver nickel, chromium, brass, cadmium, copper, gold, palladium, platinum, silver, tin and zinc**

iv) **What are the applications of electroplating?**

- Used in jewellery.
- Purification of metals.
- Changing the texture of metal surfaces.
- Preventing corrosion.
- Facilitating conduction in circuit boards.

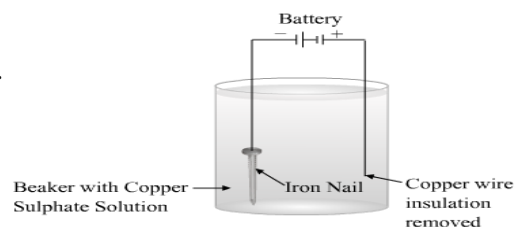
### III. **a) SHORT ANSWER TYPE QUESTIONS (2M):**

1. What happens when an electric current is passed through the copper sulphate solution?  
[When an electric current is passed through the copper sulphate solution, copper sulphate dissociates or split into copper and sulphate ions. The free copper gets drawn to the electrode connected to the negative terminal of the battery and gets deposited on it.]
2. What happens when an electric current is passed through a cut potato for a considerable time?  
[When an electric current is passed through a cut potato for a considerable time, a greenish-blue spot is formed around the positive electrode. The chemical effect of the electric current is involved in this process.]

- Why is chromium used for electroplating? Why the objects have chromium plating are not made of chromium itself?  
[Chromium has a shiny look. It does not get corroded and it resists scratches. Chromium is however expensive and it may not be economical to make the whole object out of it. So, the object is made from a cheaper metal and only a coating of chromium is done over it.]
- On what factors thickness of the electroplated items depend?  
[Thickness of electroplated items depends upon: The strength of the current passing through the circuit, the concentration of the metal ion in the solution, and the duration of the time the article has been in the solution.]
- Will the solution of sugar in distilled water conduct electricity?  
[Hint-No, the solution of sugar in distilled water is a poor conductor of electricity and therefore current cannot pass through it.]

### III. **b) SHORT ANSWER TYPE QUESTIONS (3M):**

- Name the effect of the current responsible for the glow of the bulb in an electric circuit.  
[Hint- The heating effect of electric current is responsible for the bulb to glow in an electric circuit. Due to the heating effect, the filament of the bulb gets heated to a high temperature and it starts glowing.]
- With respect to the electroplating of copper over an iron nail.
  - What is used as a positive terminal? [Hint-copper strip]
  - Name the solution used.[Hint- Copper sulphate]
  - What is used as a negative terminal? [Hint- Iron nail]



- Explain the effect of impurities on the electrical conductivity of water.  
(Hint- Impurities present in water increases the conductivity of water. When impurities (like salts) dissolve in water, they form ions, and these ions make it possible for an electric current to pass through the solution.)
- Why is tin electroplated on iron to make cans used for storing food?  
[Hint- Electroplating of tin is done on the iron to make cans used for storing food because tin is less reactive than iron. Coating of tin prevents food from coming in contact with iron and thus, prevents it from getting spoiled.]

5. Give reasons for the following.

a) Operating electrical appliances with wet hands is very dangerous.

[Operating electrical appliances with wet hands is very dangerous as it may lead to electric shocks and even death. This is because water containing impurities is a good conductor of electricity. This makes wet skin several times more electrically conductive than dry skin.]

b) Sodium chloride solution is a good conductor of electricity.

[Sodium chloride is salt, which is a poor conductor of electricity in its solid phase. However, when the salt is dissolved in water, they form sodium and chloride ions. Ions are charged particles which accommodate the flow of electric current in the salt solution. Therefore, sodium chloride solution acts as a good conductor of electricity.]

c) Pure water is a poor conductor of electricity.

[Pure water is a poor conductor of electricity because it has very few ions in it to conduct electricity.]

#### IV. LONG ANSWER TYPE QUESTIONS (5 M):

1. a) In the circuit given in the figure, Boojho observed that copper is deposited on the electrode connected to the negative terminal of the battery. Paheli tried to repeat the same experiment. But she could find only one copper plate. Therefore, she took a carbon rod as the negative electrode. Will copper be still deposited on the carbon rod? Explain your answer.

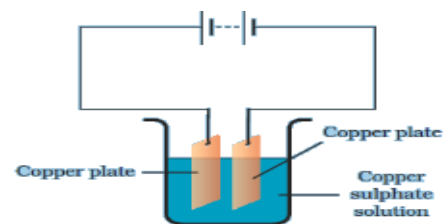


Fig.14.7 : A simple circuit showing electroplating

[Hint-Yes, copper from the copper sulphate solution will be deposited on the carbon rod. When an electric current is passed through the copper sulphate solution, copper sulphate dissociates into copper and sulphate ions. The free copper gets drawn to the electrode connected to the negative terminal of the battery, i.e. carbon rod and gets deposited on it. Thus, Paheli will obtain a coating of copper on the carbon rod.]

b) You are provided with a magnetic compass, an empty matchbox, a battery of two cells and connecting wires. Using these objects, how will you make a tester for testing an electric circuit?

[Hint-Take the tray from the inside of a discarded matchbox. Wrap an electric wire a few times around the tray. Place a small compass needle inside it. Now, connect one free end of the wire to the one terminal of a battery. Leave the other end free. Take another piece of wire and connect it to the other terminal of the battery. Join the free ends of two wires

momentarily. The compass needle shows deflection due to the magnetic effect of current. The tester with two free ends of the wire is ready.]

c) Mention one important difference in the conduction of electricity by solids and liquids. [Hint: No chemical changes take place when electricity is passed through solids while in liquids chemical changes take place when electricity is passed.]

d) Suppose you want to deposit silver on an iron spoon using silver nitrate as an electrolyte. Which terminal of the battery you should connect to the spoon? What material should the other electrode be made of?

[Silver ion is positively charged, so the spoon must be connected to a negative terminal to deposit silver on it. The other electrode should be made of silver.]

2. What are the advantages and disadvantages of electroplating?

[Electroplating is a very useful process. It is widely used in industry for coating metal objects with a thin layer of a different metal. The advantages and disadvantages of electroplating are:

Advantages:

- It protects the metals from being corroded.
- It prevents the rusting of metals.
- It makes cheap and dull metals shiny and attractive.
- It can make metals like iron less reactive.
- Chromium coating on metals gives lustre to objects.

Disadvantages

- Pollutants from electroplating industries are very harmful. Some chemicals are very lethal for both human and animals.
- It is an expensive process.]

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