

Class 08 Chemical Effects of Electric current Eureka plus Exercise solution

Tick the correct options.

1. The nucleus of an atom comprises
 - a) only protons.
 - b) only neutrons.
 - c) protons and neutrons.
 - d) electrons.
2. Protons are
 - a) positively charged
 - b) negatively charged.
 - c) neutral.
 - d) sometimes positively charged.
3. When NaCl dissolves in water, it breaks into
 - a) only sodium ions.
 - b) sodium and chloride ions.
 - c) chlorine atoms.
 - d) sodium atoms.
4. A strong acid is
 - a) a non-electrolyte.
 - b) weak electrolyte.
 - c) strong electrolyte.
 - d) non-conductor.
5. The electrode connected to the positive terminal is the
 - a) cathode
 - b) anode.
 - c) Cation
 - d) anion.
6. The metal object which is to be electroplated is fixed at the
 - a) cathode
 - b) anode.
 - c) cathode or anode.
 - d) centre.

Answer: 1. C 2. A 3.B 4. C 5.B 6. A

Answer the following questions in one sentence.

1. What is an atom?

The smallest particles of matter take part in chemical reactions.

2. Differentiate between protons and electrons.

Protons are positively charged atoms. Protons are present in the nucleus of an atom.

Electrons are negatively charged particles that revolve around the nucleus of an atom in fixed orbits called shells.

3. What is an anion?

Negatively charged atoms are called anions. An atom gains electrons to form an anion.

4. What charge does a cation carry?

Cations carry positive charges. An atom loses electrons to form cations.

5. Define ionisation.

Some compounds when dissolved in water split up into cations and anions. This process is called ionization.

6. Give an example of an electrolyte.

H_2SO_4 , NH_4OH

7. Name a strong and a weak electrolyte.

Strong electrolytes are NaCl , CuSO_4 , HCl , H_2SO_4

Weak electrolytes are H_2CO_3 , NH_4OH , CH_3COOH

8. Name the two electrodes in an electrolytic cell.

Anode and Cathode

9. What is electrolysis?

Chemical change caused by passing current through an electrolyte is called electrolysis.

10. Mention one use of electroplating.

Increase the thickness of undersize metal parts

Coating layer of desired metal to prevent corrosion and to increase shining.

Answer the following questions in two to three sentences.

1. Differentiate between anode and cathode.

An electrode connected to positive terminal of battery is called anode.

An electrode connected to negative terminal of battery is called cathode

2. What are conductors and insulators? Give an example for each.

Any substance which allows current to pass through is called conductor like metals, Acids

Any substance which doesn't allow current to pass through is called insulator like Glass, Plastic

3. What happens to common salt when it dissolves in water?

Common salt ionized into Sodium and chloride ions.

4. Why is glucose a non-electrolyte?

Glucose cannot ionize so it is a non-electrolyte

5. Why is sulphuric acid called an electrolyte?

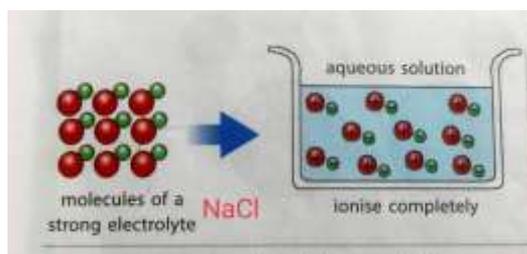
Sulphuric acid ionize completely so it is called an electrolyte

6. What is electroplating?

The process of making layer of desired metal over another metal by electrolysis is called electroplating.

Answer the following questions in detail.

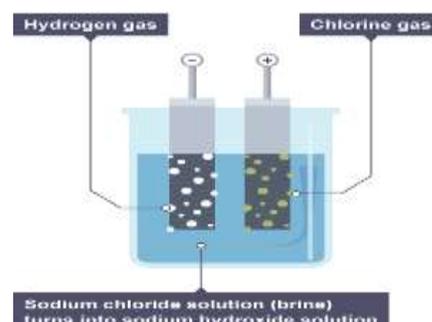
1. Draw a labelled diagram to show that hydrochloric acid (HCl) forms a strong electrolyte.



2. Explain electrolysis of NaCl.

Ans: Process: (A) When an electric current is passed through concentrated sodium chloride solution splits up into Na^+ and Cl^- ions whereas water splits up into H^+ and OH^- ions

(B) Chloride ions $Cl^-(aq)$ move to anode to form chlorine gas, $Cl_2(g)$



(C) Hydrogen ions $H^+(aq)$ (from the water) move to cathode to form hydrogen gas, $H_2(g)$

(D) Sodium ions $Na^+(aq)$ (from the dissolved sodium chloride) and hydroxide ions $OH^-(aq)$ (from the water) stay behind - they form sodium hydroxide solution, $NaOH(aq)$

3. Explain with a suitable example the electroplating of a metal object. Eg Copper over iron spoon

Ans: Process

a. Copper is taken as Anode and Iron spoon as cathode.

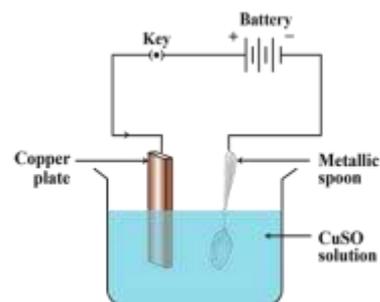
b. $CuSO_4$ taken as electrolyte

c. When current passes through electrolyte $CuSO_4$ splits up into Cu^{+2} and SO_4^{-2}

d. Cu^{+2} from electrolyte move to cathode to gain electrons to form layer of copper over iron spoon

e. Cu as anode loose electron to form Cu^{+2} ions and form $CuSO_4$

This process continue till layer of cu form over iron spoon.



4. How is copper refined by electrolysis?

Process:

a. Impure Copper rod is taken as Anode and pure copper rod taken as cathode.

b. $CuSO_4$ taken as electrolyte

c. When current passes through electrolyte $CuSO_4$ splits up into Cu^{+2} and SO_4^{-2}

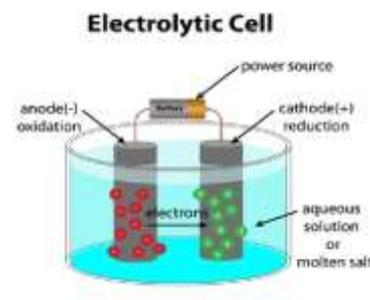
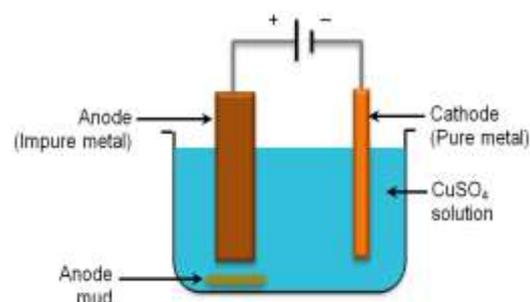
d. Cu^{+2} from electrolyte move to cathode to gain electrons to form layer of copper over pure copper rod.

e. Cu as anode loose electron to form Cu^{+2} ions and form $CuSO_4$

This process continues till a thick layer of copper form over cathode.

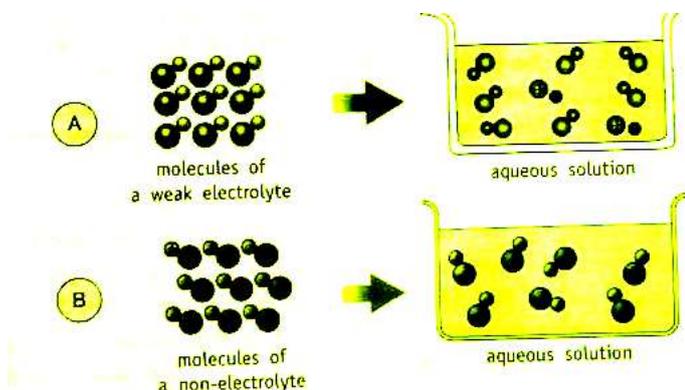
Impurities settle below anode and called anode mud.

5. Draw a labelled diagram of an electrolytic cell.



HOTs

1. Draw atoms or molecules in Container A and B to show weak and strong Electrolyte solution



2. In an electroplating chamber, the anode is a copper rod. What will happen to the anode if the chamber is used to coat copper on iron objects using copper sulphate (CuSO_4) solution? Will the electrode be damaged? Why?

Ans: The anode (copper) releases positively-charged ions. The copper ions move from the anode to the cathode through the copper sulphate (CuSO_4) solution and deposit on the metal object at the cathode, which is an iron object. The anode reduces in size.

3. A mixture of table salt (NaCl) and glucose powder is dissolved in distilled water. Will the solution conduct electricity? Why?

Ans: Yes, the solution will conduct electricity. Although glucose is a non-electrolyte, NaCl is a strong electrolyte and hence the ions in NaCl will carry charges enough to conduct electricity.

Give reasons.

1. If you try to switch on an appliance with wet hands, you are likely to experience an electric shock.

Ans Wet hands contain water which is a non-electrolyte and a bad conductor of electricity. But water can contain dissolved salts. The salts conduct electricity resulting in an electric shock.

2. All compounds that dissolve in water are not electrolytes.

Ans: Compounds such as glucose and alcohol dissolve in water but do not contain ions. Compounds that do not contain ions cannot conduct electricity are called non-electrolytes.

3. A bulb glows dimly when current is passed through a solution of vinegar.

Ans: Vinegar or acetic acid is a weak electrolyte and when dissolved in water can ionize only partially. All molecules do not break into ions. Hence vinegar conducts electricity weakly which makes the bulb glow very dimly.

4. Distilled water is not a conductor of electricity.

Ans: Distilled water is not a conductor of electricity as it does not contain dissolved salts to ionize in water and generate an electric flow. Without ions in water there is no electricity conducted and hence it is a non-electrolyte.

5. Bubbles form at the anode when current is passed through NaCl.

Ans: Due to the chemical change in the electrolyte when the ions move from the anode to the cathode in the electric chamber, bubbles of gas are deposited on the anode.

6. At times while electroplating a plate, a part of it is covered with wax.

Ans: Wax is used to cover those parts of the metal which need not be electroplated.

Great Scientist

Luigi Galvani contribution to electricity



Luigi Galvani was an Italian physician and physicist. Based on such unusual observations Galvani concluded that there was a type of electrical fluid inherent in the body, which he dubbed animal electricity. According to his view, the nervous system delivered animal electricity to muscle tissue.

The intimate relationship between biology and electricity has motivated intense scientific inquiry since 1783, when Italian physician Luigi Galvani accidentally shocked an inanimate frog leg into movement