

Worksheet-Electrolysis-1

Question 1:

- a) Here is an electrode reaction: $[\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-]$
At which electrode (anode or cathode) would such a reaction take place? Is this an example of oxidation or reduction?
- b) A solution contains magnesium ions (Mg^{2+}) iron (II) ions (Fe^{2+}) and copper ions (Cu^{2+}). On passing an electric current through this solution which ions will be the first to be discharged at the cathode? Write the equation for the cathode reaction.
- c) Why is carbon tetrachloride, which is a liquid, a non-electrolyte?
- d) Identify the following reactions as either oxidation or reduction:-
(i) $\text{O} + 2\text{e}^- \rightarrow \text{O}^{2-}$
(ii) $\text{K} - \text{e}^- \rightarrow \text{K}^+$
(iii) $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$

Question 2:

- a) Fill in the blanks:
(1) as we descend the electrochemical series containing cations, the tendency of the cations to get _____ (oxidized/reduced) at the cathode increases.
The (higher/lower) _____ the concentration of an ion in a solution, the greater is the probability of its being discharged at its appropriate electrode. (iii) Cations are formed by (Loss/gain) of electrons and anions are formed by (Loss/gain) of electrons. (iv) Electrolysis is the passage of(electricity/electrons) through a liquid or a solution accompanied by a..... (physical/chemical) change.
- b) Explain why Copper, though a good conductor of electricity, is a non-electrolyte.
- c) Name the gas released at the cathode when acidulated water is electrolysed.
- d) Explain why solid Sodium chloride does not allow electricity to pass through.
- e) What kind of particles will be found in a liquid compound that is a non-electrolyte?
- f) If HX is a weak acid, what particles will be present in its dilute solution apart from those of water?
- g) Which ions must be present in a solution used for electroplating a particular metal?
- h) Explain how electrolysis is an example of redox-reaction?

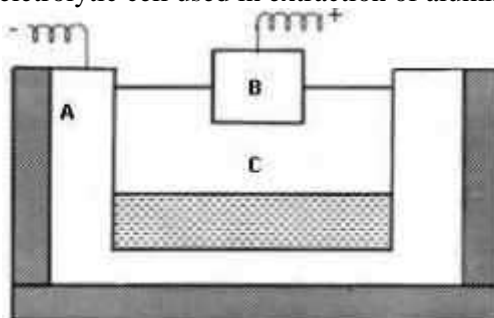
Question 3

Choose A, B, C or D to match the descriptions (i) to (v) below. Some alphabets may be repeated. [A non-electrolyte; B strong electrolyte; C weak electrolyte; D metallic conductor]

- (i) Molten ionic compound
(ii) Carbon tetrachloride
(iii) An aluminium wire
(iv) A solution containing solvent molecules, solute molecules and ions formed by the dissociation of solute molecules.
(v) A sugar solution with sugar molecules and water molecules

Question 4:

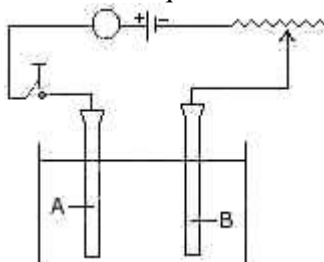
- (a) following is the sketch of electrolytic cell used in extraction of aluminium:



- (i) What is the substance of which the electrodes of A and B are made?
- (ii) At which electrode (A or B) is the aluminium formed?
- (iii) What are the two aluminium compounds in the electrolyte C?
- (iv) Why is it necessary for electrode B to be continuously replaced?

Question 5:

- (i) Study the diagram given below and answer the questions that follow:



- (1) Give the names of the electrodes A and B.
- (2) Which electrode is the oxidizing electrode?

(ii) A strip of copper is placed in four different colourless salt solutions. They are KNO_3 , AgNO_3 , $\text{Zn(NO}_3)_2$, $\text{Ca(NO}_3)_2$. Which one of the solutions will finally turn blue?

(iii) Write the equations of the reactions that take place at the cathode and anode when acidified water is electrolysed.

Question 6:

- a) Electrons are getting added to an element Y.
 1. Is Y getting oxidized or reduced?
 2. What charge will Y have after the addition of electrons?
 3. Which electrode will Y migrate to during the process of electrolysis?
- b) Acids dissolve in water to produce positively charged ions. Draw the structure of these positive ions.
 1. Explain why Carbon tetrachloride does not dissolve in water.
 2. Elements Q and S react together to form an ionic compound. Under normal conditions, which physical state will the compound QS exist in?
 3. Can Q and S, both be metals? Justify your answer.

Question 7:

1. What is an electrolyte?
2. Classify following substance under three headings:
Strong Electrolytes, Weak Electrolytes, Non Electrolytes
Acetic acid, ammonium chloride, ammonium hydroxide, carbon tetrachloride, dilute hydrochloric acid, sodium acetate, dilute sulphuric acid
3. Choosing only words from the following list, write down the appropriate words to fill in the blanks: From (i) to (v) below: [anions, anode, cathode, cations, electrode, electrolyte, nickel, voltmeter.]
To electroplate an article with nickel requires an (i) which must be a solution containing (ii) ions. The article to be plated is placed as the (iii) of the cell in which the plating is carried out. The (iv) of the cell is made from pure nickel. The ions that are attracted to the negative electrode and discharged are called (v)