TEST-B

SOLVED

Time: 1 hr. **Max. Marks: 30**

SECTION-A

Tick correct option:

1. Which of the following will produce the same product at anode as dilute sulphuric acid using inert electrodes? **[1]**

   (i) aqueous $CuCl_2$ (ii) Conc. H_2SO_4

   (iii) molten NaCl (iv) aqueous $AgNO_3$

2. The number of coulombs required to consume 9.8 g of sulphuric acid during the discharging of lead storage battery is **[1]**

   (i) 0.965×10^3 (ii) 9650 (iii) 96500 (iv) 19300

3. The net cell reaction corresponding to the galvanic cell **[1]**

   $$Pt(s) \mid H_2(g) \mid H^+(aq) \mid\mid Cl^-(aq) \mid Cl_2(g) \mid Pt(s) \text{ is}$$

   (i) $H_2(g) + 2Cl^-(aq) \rightleftharpoons 2H^+(aq) + Cl_2(g)$

   (ii) $2H^+(aq) + 2Cl^-(aq) \rightleftharpoons H_2(g) + Cl_2(g)$

   (iii) $H_2(g) + Cl_2(g) \rightleftharpoons 2H^+(aq) + 2Cl^-(aq)$

   (iv) $H^+(aq) + Cl^-(aq) \rightleftharpoons H_2(g) + Cl_2(g)$

Assertion-Reason type Questions:

(i) If assertion and reason both are correct and reason is the correct explanation of assertion.

(ii) If assertion and reason both are correct and reason is not the correct explanation of assertion.

(iii) If assertion is correct and reason is wrong.

(iv) If assertion is wrong and reason is correct.

4. Assertion: The oxidation state of manganese changes from +4 to +3 when the dry cell is in use. **[1]**

   Reason: Dry cell act as a galvanic cell when in use.

5. Assertion: $E^o_{Ag^+/Ag}$ is same as $E^o_{2Ag^+/2Ag}$ **[1]**

   Reason: E° (electrode potential) is an intensive quantity.

One word /One Sentence type Questions.

6. State Faraday's second law of electrolysis. **[1]**

7. Write an equation relating E^{o}_{cell} with **[1]**

   (i) $\Delta_r G°$ (ii) equilibrium constant

SECTION-B

8. Calculate the electrode potential of a hydrogen electrode at pH =10 at 25°C **[2]**

9. Give reason: **[2]**

   (i) There is a steep rise in molar conductance when C $\rightarrow$ 0 for a weak electrolyte.

   (ii) Electrolysis of aq. $CuSO_4$ solution using inert electrodes liberates copper at cathode and not H_2.

10. Given: $Zn(s) + 2Ag^{+}_{(aq)} \longrightarrow Zn^{2+}_{(aq)} + 2Ag(s)$ **[2]**

    (i) Construct a spontaneous galvanic cell showing the correct polarity of the electrodes.

    (ii) Show the direction of flow of electrons.

    (iii) Calculate the maximum work that can be obtained by using this cell reversibly at 25°C.

    Given: $E^{o}_{cell} = +1.56\,V$

11. (i) Write a half-reaction when the standard hydrogen electrode act as a negative electrode. **[3]**

    (ii) How is cathodic protection different from galvanization?

    (iii) Define limiting value of the molar conductance.

12. A steady current of 100A is passed through a cell containing $AgNO_3$ solution connected in series with a cell containing dilute H_2SO_4. This current results in the deposition of 1.08 g Ag at cathode. (At mass of Ag = 108). **[3]**

    (i) For how long the current was passed?

    (ii) Calculate the volume of O_2 gas evolved at STP in the cell with dilute H_2SO_4.

13. What do you understand by primary and secondary cells? **[3]**

    Write the anode and cathode reaction for Zinc-mercuric oxidic button cell.

14. For the reaction $H_2(g) + Cl_2(g) \longrightarrow 2H^{+}_{(aq)}(0.02M) + 2Cl^{-}_{(aq)}(0.02M)$ **[3]**

    Calculate the cell potential at 25°C. Given:

    $Cl_2(g) + 2e^{-} \rightarrow 2Cl^{-}(aq)$ $E° = +1.36$ V

    $H_2(g) + 2e^{-} \rightarrow 2H^{+}(aq)$ $E° = +0.0$ V

15. (a) The conductivity of 0.0.1 M ethanoic acid solution at 25°C is 1.63×10^{-4} S cm^{-1}. Given:

    $$\wedge^{o}_{HCl} = 426\ S\ cm^2\ mol^{-1}$$

    $$\wedge^{o}_{CH_3COONa} = 91\ S\ cm^2\ mol^{-1}$$

    $$\wedge^{o}_{NaCl} = 126\ S\ cm^2\ mol^{-1}$$

    Calculate the percentage dissociation of ethanoic acid.

    (b) Predict the products of electrolysis of conc. H_2SO_4 using platinum electrodes.

    (c) Define conductivity. How is it related with conductance? **[3+1+1]**