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**Max Time : 1 ½ hr** **Class = 12th Chemistry Test**  **Max Marks : 40**

**SOLUTION + ELECTROCHEMISTRY**

1. Multiple choice questions : [ 1 X 5 = 5]
2. A voltaic cell is made by connecting two half cells represented by half equations below :

Sn2+ (aq) + 2 e –  Sn (s) Eo = 0.14 V ; Fe3+ (aq) + e –  Fe2+ (aq) Eo = 0.77 V

Which statement is correct about this voltaic cell?

|  |  |
| --- | --- |
| a) Fe2+ is oxidized and the voltage of the cell is – 0.91 V | b) Sn is oxidized and the voltage of the cell is 0.91 V |
| c) Fe2+ is oxidized and the voltage of the cell is 0.91 V | d) Sn is oxidized and the voltage of the cell is 0.63 V |

1. Which one of the following pairs will form an ideal solution?

|  |  |
| --- | --- |
| a) Chloroform and acetone | b) Ethanol and acetone |
| c) n-hexane and n-heptane | d) Phenol and aniline |

1. A hypothetical electrochemical cell is shown below:

A | A+ (x M) || B+ (y M) | B.

The emf measured is + 0.20 V. The cell reaction is :

|  |  |
| --- | --- |
| a) A + B+ A+ + B | b) The cell reaction cannot be predicted |
| c) A+ + e –  A ; B+ + e –  B | d) A+ + B A + B+ |

1. The value of van’t Hoff factor for ethanoic acid in benzene is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 | b) 1.5 | c) 0.5 | d) 2 |

1. Which of the following cell was used in Apollo space programme?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Mercury cell | b) Daniel cell | c) H2 – O2 Fuel cell | d) Dry cell |

1. In comparison to a 0.01 M solution of glucose, the depression point of a 0.01 M MgCl2 solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) the same | b) about twice | c) about 3 times | d) about 6 times |

1. The electrolyte used in the mercury cell is :

|  |  |
| --- | --- |
| a) paste of NH4Cl and ZnCl2 | b) Paste of HgO and carbon |
| c) paste of KOH and ZnO | d) paste of PbO and H2SO4 |

1. For a non-ideal solution showing positive deviation , Vmixing is \_\_\_\_\_\_\_ and Vmixing is \_\_\_\_\_\_\_\_\_. [ 1 ]
2. Size of resin \_\_\_\_\_\_ when kept in water due to osmosis. [ 1 ]
3. S.I. unit of Molal elevation constant (Kb) is \_\_\_\_\_\_\_\_\_. [ 1 ]
4. What is cathodic protection? [ 1 ]
5. Why are aquatic species more comfortable in cold water in comparison to warm water? [ 1 ]
6. Define Molal depression constant or cryoscopic constant. [ 1 ]
7. Calculate the degree of dissociation () of acetic acid if its molar conductivity () is 39.05 S cm2 mol – 1 . [Given : (S cm2 mol – 1 ) : H+ = 349.6 S cm2 mol – 1  , CH3COO –  = 40.9 S cm2 mol – 1]. [ 2 ]

Or

When a current of 0.75 A is passed through CuSO4 solution for 25 min, 0.369 g of copper is deposited at the cathode. Calculate the atomic mass of copper?

1. Write Nernst equation for the reaction : [ 2 ]

(i) 2 Cr (s) + 3 Cd2+ (aq) 2 Cr3+ (aq) + 3 Cd (s) (ii) 2 Cr + 3 Fe2+ 2 Cr3+ + 3 Fe

1. Henry’s law constant for the molality of methane in benzene at 298 K is 4.27 x 10 5mm Hg. Calculate the solubility of methane in benzene at 298 K under 760 mmHg. [ 2 ]
2. For the equilibrium, 2 H2 (g) + O2 (g) ⇌ 2 H2O (l) at 25˚C, Go is – 474.78 KJ/mol. Calculate log K for it [ 2 ]
3. (a) Cooking is faster in pressure cooker than in cooking pan. [ 2 ]

(b) Red blood cell (RBC) shrink when placed in saline water but swell in distilled water.

1. Write the chemistry of recharging the lead storage battery. [ 2 ]

Or

What is the role of ZnCl2 in a dry cell?

1. Calculate the emf of the cell : Cd | Cd2+ (0.1 M) || H+ (0.2 M) | Pt, H2 (0.5 atm) ; [ 3 ]

Given : = 0.403 volt , R = 8.314 J K – 1 mol– 1 , F = 96500 C/mol

1. A potential difference of 20 volts applied to the ends of a column of M/10 AgNO3 solution, 4 cm in diameter and 12 cm in length gave a current of 0.2 A. Calculate the specific and molar conductivities of the solution.

[ 3 ]

1. A 0.01 m aqueous solution of AlCl3 freezes at – 0.068˚C. Calculate the percentage of dissociation? Kf for water = 1.86 K kg/mol. [ 3 ]
2. State Raoult’s law for the solution containing volatile components. Write two differences between an ideal solution and a non-ideal solution. [ 3 ]
3. Represent the cell in which the following reaction take place: [ 3 ]

2 Al (s) + 3 Ni2+ (0.1 M) 2 Al3+ (0.01 M) + 3 Ni (s). calculate the emf if Eo = 1.41 V