HB-003-1016008

B. Sc. (Sem. VI) (CBCS) (W.E.F. 2016) Examination

April - 2023

Chemistry : C-603

(Physical & Analytical Chemistry)

Faculty Code : 003
Subject Code : 1016008

Time : $2\frac{1}{2}$ / Total Marks : **70**

1 **(a)** Answer the following :   **4**
    (1) What is the value of entropy change in reversible process ?
    (2) According to which theory heat capacity of crystalline substance at low temperature is $Cp=Cv=\alpha\,T^3$.
    (3) Define activity coefficient.
    (4) What is the ionic strength of 0.01 m KCl solution ?

  (b) Answer any one :   **2**
    (1) Calculate ionic strength of 0.001m BaCl2 solution.
    (2) What are the uses of 3rd law of thermodynamics ?

  (c) Answer any one :   **3**
    (1) State any two statements of 3rd law of thermodynamics.
    (2) Short note on ionic strength.

  (d) Answer any one :   **5**
    (1) Discuss EMF method for determination of activity coefficient.
    (2) Derive $S_T = Cp/3$.

2 **(a)** Answer the following :   **4**
    (1) Write the oxidation and reduction reaction by hydrogen electrode.
    (2) The cell is Pt, H2 / H^+ ion solution / Sat. KCl, Hg_2Cl_2, Hg. Name the electrodes used in the given cell.
    (3) Define Liquid Junction Potential.
    (4) If concentration of cell is 3.3×10^{-6} what is pH value ?

(b) Answer any one :   **2**
    (1) The valency of mercuric ion is 2. Explain using emf measurement.
    (2) Explain electrolyte concentration cell using an example.
    (3) Explain electrode concentration cell using an example.

(c) Answer any one :   **3**
    (1) Explain determination of dissociation constant of weak acid using emf measurement.
    (2) Determine pH of the given cell Pt, $H_{2(g)}$ / H^+ Sol. // Sat. KCl, Hg_2Cl_2, Hg, Emf of calomel electrode is 0.242V and the emf of the cell is 0.642V.

(d) Answer any one :   **5**
    (1) Derive $E_{w.o.t} = RT/F \ln a_2/a_1$
    (2) Explain determination of ionic product of water using emf measurement.

3 (a) Answer the following :   **4**
    (1) Define intensive and extensive properties.
    (2) Write the equation of Raoult's law and Nernst distribution law.
    (3) Define : Precision and error.
    (4) Give only formula of standard deviation.

(b) Answer any one :   **2**
    (1) Explain Partial Molar Property.
    (2) Write note on student Q-test.

(c) Answer any one :   **3**
    (1) Derive Henry's law using chemical potential.
    (2) Write short note on significant figure.

(d) Answer any one :   **5**
    (1) Derive Gibbs Duhem equation.
    (2) Explain types of errors.

4 (a) Answer the following :   **4**
    (1) Silica is Strong adsorbent (True or False)
    (2) Define : Rf Value.
    (3) Who gave the idea of Chromatography ?
    (4) Define : Stationary phase.

(b) Answer any one :   **2**
    (1) Write uses of column chromatography.
    (2) Give advantages of TLC (any four)

(c) Answer any one : 3

    (1) Explain separation of α, β, γ carotene from carrot by chromatography.

    (2) Define ion exchange chromatography and explain cation exchange chromatography.

(d) Answer any one : 5

    (1) Write note on Gas chromatography.

    (2) Write note on Thin layer chromatography.

5 (a) Answer the following : 4

    (1) Give formula of Magnesia mixture.

    (2) Name the primary reference electrode.

    (3) Write the Nernst equation to determine emf.

    (4) In calomel electrode which solution plays an important role for the value of emf.

(b) Answer any one : 2

    (1) Discuss separation of Cl^-, Br^- and I^- (any one method)

    (2) Write any two uses of glass electrode.

(c) Answer any one : 3

    (1) Explain separation of Cu^{+2} and Cd^{+2}.

    (2) Discuss Argentometric titration by potentiometric titration.

(d) Answer any one : 5

    (1) Explain separation of $CO3^{-2}$, $SO3^{-2}$ and S^{-2}.

    (2) What is Redox titration ? Discuss redox titration of $FeSO_4 \rightarrow CeSO_4$ by potentiometric titration.

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