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Roll No.

Total Pages : 4

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B.Sc. (Chem.) - III SEMESTER

Physical Chemistry-III (BCH-303)

Time : 90 Minutes]

[Max. Marks : 25

Instructions :

1. *It is compulsory to answer all the questions (1 mark each) of Part-A in short.*
2. *Answer any three questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted at one place.*

PART - A

Note : For Question 1, Select appropriate answer from the below four choices – 'A' to 'D'

- (A) Only A is correct.
- (B) Only R is correct.
- (C) Both A and R are correct, but R is not correct explanation of A.
- (D) Both A and R are correct, R is correct explanation of A.

3. Write a short note on transference. Explain transference number and describe its application in electrochemistry. The standard electrode potential of Mg^{+2}/Mg and Ag^+/Ag are -0.763 V and $+0.799\text{ V}$ respectively. Find out the standard potential of the cell. (PO2-5, CO-2) (5)
4. Explain reversible and irreversible cells with suitable examples. A specific conductivity of N/10 KCl solution at 20°C is $0.0212\text{ ohm}^{-1}\text{cm}^{-1}$ and resistance of the cell containing this solution is 55 ohm , what is the cell constant? (PO2-5, CO-2) (5)
5. Derive Clausius-Clapeyron equation and what is the significance in its applications to solid-vapour equilibria. Sketch phase diagram for an incongruent melting point system. (PO2-4, CO-1) (5)
6. Describe Langmuir adsorption isotherms and explain factors affecting adsorption. The heat of fusion of Hg at its normal melting point -38.9°C is 2.82 cal/g . The densities of Hg(s) and Hg(l) at -38.9°C and 1 atm are 14.193 and 13.690 g/cm^3 respectively. Find the melting point of Hg at 100 atm. (PO1-4, CO-3.4) (5)

1. (a) (A) In aqueous solution, SO_2 reacts with H_2S liberating S.
 (R) SO_2 is an effective reducing agent (PO2-5, CO-2) (1)
- (b) (A) Transport Number of Na^+ is less than that of K^+ .
 (R) Size of Na^+ ion is smaller than that of K^+ (PO2-5, CO-2) (1)
- (c) (A) Transport number cannot be Zero.
 (R) Transport number may increase or decrease with Temperature. (PO2-5, CO-2) (1)
- (d) (A) Negative value of electrode potential means oxidation w.r.t. to NHE?
 (R) Greater the reduction potential, stronger is oxidizing agent. (PO2-5, CO-2) (1)
- (e) (A) Electrochemical cell stops working after some time.
 (R) Electrode potential of both electrodes become equal in electrochemical cells after some time. (PO2-5, CO-2) (1)
- (f) (A) Cl_2 is less reactive than F_2 .
 (R) Strong electropositive metal can displace weak electropositive metals. (PO2-5, CO-2) (1)
- (g) (A) Burning of lime is an oxidation process.
 (R) Oxide of metal is produced on burning. (PO2-5, CO-1.2) (1)

- (h) (A) Sudden removal of salt-bridge in working cell results in?
 (R) It stops functioning after some time. (PO2-5, CO-2) (1)
- (i) For a two-component system.
 (A) Compared to pure substance the eutectic temperature can be equal to freezing point.
 (R) Degree of freedom below the eutectic temperature for a condense system is one. (PO1-2, CO-1) (1)
- (j) For the distribution law validity
 (A) Temperature must remain constant.
 (R) Existence of similar molecular species in two phases in contact can be obtained at very dilute liquids which are mutually immiscible. (PO1-2, CO-1) (1)

PART-B

2. Write Gibbs-Duhem-Margules equation and explain its applications to fractional distillation of binary non-ideal miscible liquids.
 The normal Boiling Point of ethanol is 78.3°C and at this temperature heat of vapourization of ethanol is 38.9 kJ/mol . To what value P must be reduced to boil ethanol at 25°C in vacuum distillation. (PO3-4, CO-1) (5)