



বিদ্যাসাগর বিশ্ববিদ্যালয়
VIDYASAGAR UNIVERSITY
Question Paper

B.Sc. Honours Examinations 2022

(Under CBCS Pattern)

Semester - IV

Subject: CHEMISTRY

Paper : C 8-T

Physical Chemistry - III

Full Marks : 40

Time : 2 Hours

Candidates are required to give their answer in their own words as far as practicable.

The figures in the margin indicate full marks.

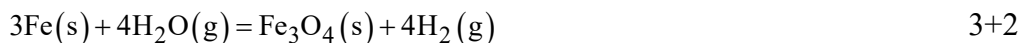
Group - A

Answer any **four** questions :

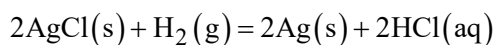
5×4=20

1. (a) A sample is either glucose or sucrose. How will you confirm the sample by osmotic pressure measurement ?

(b) Write down the number of phases, components and degrees of freedom of the following equilibrium.



2. (a) Construct a cell where following reaction occurs.



(b) During heating at normal pressure ice melts but dry ice sublimates. Explain. 2+3

3. (a) Quinhydrone electrode should not be used above pH 8. Explain.
- (b) Using Debye Huckel limiting law determine the activity of 0.1 M CaCl_2 solution. Debye Huckel constant $A = 0.51$ 2+3
4. (a) How will you confirm a sample as polar or non-polar by molar polarization measurement ?
- (b) Liquids A and B form an ideal solution. In a binary solution of A and B the mole fraction of A is 0.33. Calculate the composition of the vapour in equilibrium with the solution. 2+3
5. (a) What is radial distribution function ?
- (b) Boiling point of a solution is generally greater than that of pure solvent. Explain. 2+3
6. (a) Show that the commutator $[L^2, L_z] = 0$ where L is angular momentum operator.
- (b) Melting point of ice decreases with increasing pressure. Explain it using Clapeyron equation. 3+2

Group - B

Answer any *two* questions : 10×2=20

7. (a) Derive thermodynamically Raoult's Law of relative lowering of vapour pressure.
- (b) The emf of Weston cadmium standard cell is 1.01530V at 20°C and 1.01807V at 25°C. Calculate ΔG , ΔS and ΔH for the cell reaction at 25°C.
- (c) State Gibbs phase rule. 4+4+2
8. (a) Draw and explain the phase diagram of CO_2 . 5
- (b) What is critical solution temperature (C.S.T.) ? Explain it for water-phenol system. 3
- (c) Explain the Azeotropic Mixture with example. 2
9. (a) Calculate the mean ionic activity coefficient of a 0.001 molal solution Na_2SO_4 . 3
- (b) What are the limitations of Debye-Huckel Limiting Law ? 2
- (c) Draw and explain conductometric titration plot for KCl and AgNO_3 reaction. 3
- (d) How does common ion effect affect pH ? 2

10. (a) Describe qualitatively the MO and VB treatment of Hydrogen molecule. 5

Or;

Describe qualitatively the procedure of setting up of Schrodinger equation for many electron atom (He). 5

- (b) Deduce Duhem-Margulas equation and show that if Raoult's law be applicable to one constituent of binary liquid mixture all components, it must be applicable to the other constituent. 3+2

Vidyasagar University