Bachelor of Science (B.Sc.- II) (CBCS Pattern) Third Semester (New) USCCHT06 - Chemistry Paper-II (Physical Chemistry)

P. Pages : 2 Time : Three Hours		2 ree Hours $\star 3 6 7 6 \star$	GUG/W/18/11601 Max. Marks : 50	
	Note	 All five questions are compulsory and carry equal marks. Draw diagrams wherever necessary. Use of calculator is permitted. 		
1.	a)	Derive Clausius -Clapeyron equation for liquid-Vapour equilibrium. Explanation.	ain its one 5	
	b)	Discuss phenol-water system of partially miscible liquids. Explain the effection impurities on critical solution temperature.	ect of 5	
	c)	Describe lead - silver system using phase diagram.	21/2	
	d)	State and explain Raoult's Law of ideal solutions.	21/2	
	e)	Write note on steam distillation.	21/2	
	f)	State phase Rule. Explain the meaning of terms involved in it.	21/2	
2.	a)	 Define Gibb's Free energy. and explain its physical significance. The free energy change for the process is -84.28 kJ at 303 K and -80. 313 K Calculate the change in enthalpy at 308 K. 	5.28 kJ at	
	b)	Derive an integrated form of Van't Hoff reaction isochore. OR	5	
	c)	Discuss entropy as criteria of spontaneity and equilibrium.	21/2	
	d)	Define Helmholtz free energy. Explain its physical significance.	21/2	
	e)	Derive the relation between standard free energy change and equilibrium of	constant. $2^{1/2}$	
	f)	Calculate entropy change when 28 g of nitrogen gas expand reversibly fro 40 lit. at 25°C. ($R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$)	m 4 lit. to 2 ¹ / ₂	
3.	a)	What is first order reaction? Derive an expression for rate constant of first reactions. A second order reaction, which is 25% completed in 600 sec. How long will it take to complete	order 5	
	b)	Explain homogeneous and heterogeneous catalysis with example. State the characteristics of catalyst.	e 5	
		OR Describe verices factors that effects the rote of reaction	214	
	d)		1 2 ¹ / ₂	
	u)	The rate constant of a reaction is 1.2×10^{-5} sec ⁻¹ at 30°C and 2.1×10^{-5} s	ec. ⁻¹ at 272	
		40°C. Calculate the energy of activation of the reaction. ($R = 8.314 \text{ JK}^{-1}$	mol^{-1}	
	e)	Describe Collision theory for bimolecular reactions for similar molecules.	21/2	
	f)	What is autocatalysis? Explain with suitable example.	21/2	

4.	a)	What is Osmotic pressure? How is it measured experimentally by Berkeley and Hartley's method.	5
		Latent heat of fusion of water is 1436.3 cal/mole. Calculate molal depression constant of water. $(R = 2 \text{ cal deg}^{-1} \text{ mol}^{-1})$	
	b)	What do you mean by magnetic susceptibility. Discuss the applications of magnetic susceptibility measurement in;	5
		i) The study of co-ordination compounds and	
		ii) The calculation of number of unpaired electrons in a molecule.	
		OR	
	c)	State Raoult's Law of lowering of vapour pressure. How can it be used to determine the molecular weight of non-volatile solute in solution.	21/2
	d)	One percent aqueous solution of NaCl was freezes at 0.607 °C. Calculate Van't Hoff factor and degree of dissociation of NaCl. (kg for water = 1.85 K kg mol ⁻¹)	21/2
	e)	Explain the terms:	21/2
		i) Molarity and ii) Normality.	
		A sample of alcohol contains 95% of ethanol by weight, the rest being water. Calculate mole fraction of ethanol and water.	
	f)	How magnetic moment of a paramagnetic substance can be determined?	21/2
5.		Attempt any ten.	1x10=10
		i) What is Triple point of water system?	
		ii) State the limitations of Henry's Law.	
		iii) Write the statement of Nernst distribution law.	
		iv) Define chemical potential.	
		v) Write any two applications of Gibb's Helmholtz equation.	
		vi) What do you mean by standard free energy?	
		vii) Define inhibitors and promoters.	
		viii) What is half life period of a reaction?	
		ix) What is enzyme catalysis reaction?	
		x) Calculate the number of electron if its magnetic moment is 1.73 B.M.	
		xi) Why Boiling point increases if non-volatile solute is added in the solvent?	
		xii) Define ebullioscopic constant.	

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