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2103N1688

Candidate's Seat No :_____

M.Sc. Semester-3 Examination

502

Chemistry (P)

March-2024

Time : 2-30 Hours] **[Max. Marks : 70**

Instruction: Attempt all questions:

Q-1 **Answer the following:**

(a) What are transport properties? Derive an equation for the thermal conductivity of gases. (7)

OR

(a) How molecular diameter and the Avogadro number can be calculated from the viscosity measurements of gases. (7)

(b) Making use of the kinetic theory of gases, derive an expression for diffusion of gases. (7)

OR

(b) Explain the terms: mean free path, collision diameter and collision frequency. Show that the mean free path of a gas molecule increases with decrease in pressure. (7)

Q-2 **Answer the following:**

(a) Explain briefly diffraction of X-rays from crystals. Explain Bragg's law of X-ray diffraction. (7)

OR

(a) Explain the powder X-ray diffraction method used to determine the crystal structure. (7)

(b) Explain the Laue method to determine the unit cell parameters. (7)

OR

(b) Explain the graphical method of indexing to calculate lattice parameters of a crystal. (7)

Q-3 **Answer the following:**

(a) Explain how the composition of mixture can be determined simultaneously using spectroscopic method. (7)

OR

(a) How pK_{In} of an indicator can be determine using spectroscopic method. (7)

(b) State and illustrate with suitable potential energy curve the Frank-Condon principle in the vibronic spectrum of a diatomic molecule. (7)

OR

(b) Explain various transitions in the electronic spectra of polyatomic molecules with proper diagram. (7)

Q-4 **Answer the following:**

(a) Explain briefly Photochemical smog and the formation of Nitrogen Oxide. (7)

OR

(a) Explain the laws of photochemical equivalence. Give reasons for low and high quantum efficiency. (7)

(b) What is quantum efficiency? Explain the experimental method to determine the quantum efficiency. (7)

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OR

	(b)	Explain the composition and regions of earth atmosphere.	(7)
Q-5		**Answer the following: (Any Seven-Two marks each)**	**14**
	(i)	Explain Beer's law and its applications.	
	(ii)	What is Graham's law of effusion?	
	(iii)	Why H_2 molecule has greater mean free path than N_2?	
	(iv)	Give the limitations of Beer's law.	
	(v)	What is the importance of X-ray in the determination of crystal structure?	
	(vi)	Why we use $\sin\theta$ in the calculation of lattice parameters?	
	(vii)	Which radiation is used in photochemical reactions? Why photochemical reactions are zero order?	
	(viii)	How the particle size of the crystal is calculated from the Scherrer formula?	
	(ix)	Write postulates of the kinetic theory of gases.	