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SARDAR PATEL UNIVERSITY

M. Sc. SECOND SEMESTER Examination 2016 Thursday, 27th October 2016, 10.00 a.m. to 1.00 p.m. Course – PS02CCHE03, Physical Chemistry – II, Selected Topics

N.B. Figures to the right of each of the question indicate marks.

			*		
	Choose appropria	ite answer of th	e followings		רח
(i)	Trimolecular reacti	ions are characte	erized by		[08]
	(a) Positive E _a				
(ii)	-	(d the rate constant	d) Both Positive and for 3/2 – order rea	d Negative E _a	
	(a) (dm ⁻) " mol " s				
	_	(d)) s ⁻¹		
(iii)	Which one of the fo	llowing molecul	le shows square nv	ramidal gaomaturo	
	(a) SF ₆	(b) XeF ₄	(c) NH ₂		,
(iv)	O2 molecule has:	•	(6) 1113	(a) BrF ₅	
		(b) αC ₂ axis	(c) 3C ₂ axis	(d) 2C ovia	
(v)	Secondary structure	of protein have	:	(d) 2C ₂ axis	
(vi)	(a) α- form In RNA Pyrimidines,	(b) Helix for	rm (c) β – form	(d) Coil form	
(vii)	(a) Guanine	(b) Adenine	(c) Thymine	(d) Hracil	
	With amount	of mendant	namic control have	rate	
	(a) slower major				
			(b) faster, major		
(viii)			(d) faster, minor		
(*111)				•	
			(b) Protein & Carl	bohydrates	
	(c) Protein & Nucleic	Acid			
	(ii) (iv) (v) (vi)	 (a) Positive E_a (c) Negative E_a (ii) What is the unit of (a) (dm³)-1/2 mol¹/2 s (c) dm⁻³/2 mol³/2 s⁻¹ (iii) Which one of the fo (a) SF₆ (iv) O₂ molecule has: (a) 4C₂ axis (v) Secondary structure (a) α- form (vi) In RNA Pyrimidines (a) Guanine (vii) The product formed a with amount (a) slower, major c) slower, minor (viii) Glycoprotein hydroly (a) Protein & Phosph 	 (i) Trimolecular reactions are characters (a) Positive E_a (c) Negative E_a (d) (ii) What is the unit of the rate constants (a) (dm³)-1/2 mol¹/2 s-¹ (b) (c) dm-3/2 mol³/2 s-¹ (d) (iii) Which one of the following moleculary (a) SF₆ (b) XeF₄ (iv) O₂ molecule has: (a) 4C₂ axis (b) αC₂ axis (v) Secondary structure of protein have (a) α- form (b) Helix form (vi) In RNA Pyrimidines, the base element (a) Guanine (b) Adenine (vii) The product formed under thermodynamical with amount of product at information (a) slower, major c) slower, minor 	(a) Positive E _a (b) Zero E _a (c) Negative E _a (d) Both Positive and (ii) What is the unit of the rate constant for 3/2 – order read (a) (dm³)-1/2 mol¹/2 s⁻¹ (b) (dm³)1/2 mol⁻-1/2 s⁻ (c) dm⁻-3/2 mol³/2 s⁻¹ (d) s⁻¹ (iii) Which one of the following molecule shows square py (a) SF ₆ (b) XeF ₄ (c) NH ₃ (iv) O ₂ molecule has: (a) 4C ₂ axis (b) αC ₂ axis (c) 3C ₂ axis (v) Secondary structure of protein have: (a) α- form (b) Helix form (c) β – form (vi) In RNA Pyrimidines, the base element is (a) Guanine (b) Adenine (c) Thymine (vii) The product formed under thermodynamic control have with amount of product at infinite time. (a) slower, major (b) faster, major c) slower, minor (d) faster, minor (viii) Glycoprotein hydrolyze to give: (a) Protein & Phosphates (b) Protein & Car	(a) Positive E _a (b) Zero E _a (c) Negative E _a (d) Both Positive and Negative E _a (ii) What is the unit of the rate constant for 3/2 – order reaction? (a) (dm³)-1/2 mol ^{1/2} s ⁻¹ (b) (dm³) 1/2 mol ^{-1/2} s ⁻¹ (c) dm³/2 mol ^{3/2} s ⁻¹ (d) s ⁻¹ (iii) Which one of the following molecule shows square pyramidal geometry? (a) SF ₆ (b) XeF ₄ (c) NH ₃ (d) BrF ₅ (iv) O ₂ molecule has: (a) 4C ₂ axis (b) αC ₂ axis (c) 3C ₂ axis (d) 2C ₂ axis (v) Secondary structure of protein have: (a) α- form (b) Helix form (c) β – form (d) Coil form In RNA Pyrimidines, the base element is (a) Guanine (b) Adenine (c) Thymine (d) Uracil (vii) The product formed under thermodynamic control have rate with amount of product at infinite time. (a) slower, major (b) faster, major c) slower, minor (d) faster, minor (viii) Glycoprotein hydrolyze to give: (a) Protein & Phosphates (b) Protein & Carhohydrates

- (i) What is meant by a fast reaction? List out techniques for monitoring fast reactions.
- (ii) · Write rate equation and order of reaction for the following:
 - i. $2HI_{(g)} \rightarrow H_{2(g)} + I_{2(g)}$
 - ii. $NO_{(g)} + O_{3(g)} \rightarrow NO_{2(g)} + O_{2(g)}$
- (iii) How the order of reaction and molecularity differs from each other?
- (iv) Discuss the principle of detail balancing.
- (v) Define the term 'Point Group'. Explain rotoreflection axis with suitable example.
- (vi) Give the conformational forms in a peptide bond.
- (vii) Explain the term ribosomes.
- (viii) Enlist two differences between D₂h and C₂h point groups.
- (ix) Electrophoresis and Electroosmosis are based on electrokinetic phenomena but they differ Explain.
- 3. (a) Define Plane of symmetry with suitable example. Derive the $\begin{bmatrix} 06 \end{bmatrix}$ transformation matrix for σ_v , σ_v ' and σ_v " planes.
 - (b) There are 8 symmetry elements for C_{4V} point group. The character table [06] of this point group is shown below. Deduce the values of a, b, c and d.

1	Е	2C ₄	C_2	$2\sigma_v$	$2\sigma_d$
$\overline{\Gamma_1}$	1	1	1	1	1
Γ_2	1	1	1	-1	-1
Γ_3	1	-1	1	1	-1
Γ_{4}	1	-1	1	-1	1
Γ_{5}	2	a	b	c	ď
		?	?	?	?
	,	0	R		

- (b)

 i. Define the term symmetry operation and enlist the symmetry elements along with point group for p- Dichlorobenzene and Phenol molecules.
 - ii. Show that under orthogonal transformation, the length of the vector remains constant.

4.	(a)	Discuss the kinetic relations for a chain reaction.
	(b)	What is Relaxation time? Considering following reaction [06]
		$2A \xrightarrow{K_1} B$, derive an equation for relaxation time.
		N-I OR
	(b)	Discuss the plug flow method for determining rate of fast reaction and $\begin{bmatrix} 06 \end{bmatrix}$
		derive the equation $C_f = C_i e^{-kt}$.
5.	(a)	Show the effect of pH and different types of electrolytes on ς - potential $\begin{bmatrix} 06 \end{bmatrix}$
		of charged surface.
	(b)	Describe various models for electrical double layer.
		OR
	(b)	Give the differences between:
		i. Fibrous and Globular Proteins
		ii. Plate like and helix forms of a protein
5.	(a)	Explain the mechanism of DNA replication considering the role of $\begin{bmatrix} 06 \end{bmatrix}$
	•	different types of enzymes.
	(b)	(i) The pK _a of the newly formed ionizable group on ADP obtained from [06]
		the hydrolysis of ATP is 6.68 at 25°C ($K_a = 2.09 \times 10^{-7}$). Of the total ΔG '
		of -7700 cal/mol for the ATP hydrolysis, how much can be attributed to
		the ionization of ADP?
		(ii) The terminal phosphate of ATP has pK _a values of 6.95 and 2.3. The
		inorganic phosphate derived from the terminated phosphate has pKa
		values of 12.5, 6.82 and 2.3. Does the ionization of inorganic phosphate
		groups contribute to the total ΔG ?
		OR
	(b)	Discuss the enzyme regulation and types of regulatory enzymes. [06]