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	<b></b>									
	<u>Q.1 – Q.30 Mult</u>	iple Choice Questic	on (MCQ), carry (	<u>ONE mark each (for</u>						
	each wrong an	<u>swer: – 1/3).</u>								
1.	The complexes [Co	$(\mathrm{NH}_3)_4(\mathrm{H}_2\mathrm{O})\mathrm{Cl}]\mathrm{Br}_2$ a	and $[Co(NH_3)_4Br_2]$	Cl. H <sub>2</sub> O are examples of						
	(a) Ionization isom	erism	(b) linkage	isomerism						
	(c) Geometrical iso	merism	(d) optical isomerism							
2.	In the trigonal bip	yramidal crystal field,	eld, the d-orbital with the highest energy is							
	(a) d <sub>xy</sub>	(b) $d_{x^2-y^2}$	(c) d <sub>yz</sub>	(d) $d_{z^2}$						
3.	The magnetic mo	ment of the complex <b>I</b>	$K_3[CoF_6]$ is 5.0 $\mu_B$ .	The total stabilization						
	energy will be									
	(a) $-0.4\Delta_{o}$	(b) $-0.4\Delta_0 + P_{E} $	(c) $-2.4\Delta_{o} + 3P$	(d) $-1.8\Delta_{o} + 3P$						
4.	The metal present	at the active site of the	e protein carboxype	ptidase-A is						
	(a) Zinc	(b) Molybdenum	(c) Magnesium	(d) Cobalt						
5.	The neutral comp	lex which follows the 18	8-electron rule is							
	(a) $(\eta^{5}-C_{5}H_{5})Fe(C_{$	0)2	(b)(η <sup>5</sup> -C <sub>5</sub> H <sub>5</sub> )Μ	lo(CO) <sub>3</sub>						
	(c) $(\eta^5 - C_5 H_5)_2 Co$		(d) $(\eta^{5}-C_{5}H_{5})H_{5}$	$Re(\eta^6-C_6H_6)$						
6.	The <mark>shape</mark> of the <b>n</b>	nolecule XeO <sub>2</sub> F <sub>2</sub> is								
	(a) Distorted tetrah	edral UDV	(b) Square pl	anar						
	(c) Trigonal bipyra	midal	(d) Tetrahed	ral						
7.	<b>Triplet superphos</b>	<mark>phate</mark> is made by treati	ng phosphate rock	with						
	(a) Conc. H <sub>2</sub> SO <sub>4</sub>	(b) Conc. HNO <sub>3</sub>	(c) Conc. HCl	(d) Conc. $H_3PO_4$						
8.	The number of hy	droxy group(s) present	in Phosphorous ac	id is						
	(a) One	(b) Two	(c) Three	(d) Four						
9.	Out of the following	ng, the one which is <mark>not</mark>	an excitation sourc	e for IR spectrometer is						
	(a) Tungsten filame	ent lamp	(b) Nernst glower							
	(c) Deuterium lamp	)	(d) Mercury arc							
10.	One of the followi	ng is not related to pola	arography							
	(a) Limiting curren	t	(b) Diffusion cur	rent						
	(c) Ilkovic equation	1	(d) Current effici	ency						
11.	Among the follow	ing the optically INAC	<b>FIVE compound is</b>							
	(a) CH <sub>2</sub> CH	H <sub>3</sub>	(b) H <sub>3</sub> C - P							
	H <sub>3</sub> C <sup>1</sup> <sup>1</sup> N									
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#### 12. Esterification of the acid-P with the alcohols-Q will give



- (a) Only one enantiomer (b) a mixture of diastereomers
- (c) a mixture of enantiomers  $AM^{E} \sim M_{M}(d)$  only one diastereomer

#### 13. <sup>1</sup>H-NMR spectrum of [18]-annulene shows

- (a) Only one peak at  $\delta$  7.2 (18 H)
- (b) Only one peak at  $\delta$  5.0 (18 H)
- (c) Two peaks at  $\delta$  9.0 (12 H) and  $\delta$  3.0 (6 H)
- (d) Two peaks at  $\delta$  9.0 (6H) and  $\delta$  3.0 (12H)
- 14. The compound formed on methanolysis of 'P' is

(a) (b) 
$$OMe$$
 (c)  $OMe$  (d)  $OMe$  (c)  $OMe$  (d)  $OMe$ 

15. The pK<sub>a</sub> values for the three ionizable groups X, Y and Z of glutamic acid are
4.3, 9.7 and 2.2 respectively

$$\begin{array}{c} \mathsf{HOOC-H_2C-HC-CO_2H} \\ \mathbf{X} \qquad \qquad \stackrel{| \ \oplus \ }{\mathsf{H_3N}^{\oplus}} \mathbf{Z} \\ \mathbf{Y} \end{array}$$

CI

#### The isoelectric point for the amino acid is

16. Bridge-head hydrogen of the conformer of cis-decalin is positioned as

[a = axial; e = equatorial]

(a) a, a (b) e, e (c) a, e (d) Pseudo-a, Pseudo-e

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17. The major product of the acetylation of salicylic acid with Ac<sub>2</sub>O/H<sup>+</sup> followed by heating with anhydrous AlCl<sub>3</sub> is



18. Order of reactivity of the following dienes X, Y and Z in Diels-Alder reaction is





21. A reaction follows second order rate law,  $-d[A]/dt = k[A]^2$ , if

- (a) A plot of [A] verses t is a straight line
- (b) A plot of 1/[A] versus t is a straight line
- (c) A plot of ln[A] verses t is a straight line
- (d) A plot of e<sup>[A]</sup> versus t is a straight line
- 22. In an adiabatic system, the work done to change its state from A to B is
  - (a) Dependent on the path from A to B
  - (b) Independent of the path from A to B
  - (c) Path dependence is related to particulars of states A and B
  - (d) Path dependence is related to both states A and B and choice of path

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3



23.	The set of eigen functions $\sqrt{\frac{2}{a}} \sin \frac{n}{a}$	$\frac{\pi x}{a} (0 \le x \le a, n =$	1, 2, 3 ) is	
	(a) Orthogonal (b) Normalized	(c) Both option (a	a) and (b)	(d) Unnormalized
24.	The function $e^{ax^2}(\alpha > 0)$ is not	an acceptable wa	vefunction	for bound system,
	because			
	(a) It is not continuous	(b) It i	s multivalued	1
	(c) It is not normalisable	(d) All	of these	
25	First order perturbation correction	on $\Delta \epsilon_n^{(1)}$ to energy	v level $\boldsymbol{\epsilon}_n$ of	a simple harmonic
	oscillator due to the an harmonici	ty perturbation γx	<sup>3</sup> is given by	
	(a) $\Delta \varepsilon_n^{(1)} = \gamma$ (b) $\Delta \varepsilon_n^{(1)} = \gamma$	$\chi^2_{\rm E} \sim 10^{-10} {\rm sc}^{-10}$	$\gamma^{-1} = \gamma^{-1}$	(d) $\Delta \epsilon_n^{(1)} = 0$
26.	<b>Resonant frequencies for EPR and</b>	l NMR are respect	ively in the s	pectral region
	(a) Microwave and far-IR	(b) Far-	IR and micro	wave
	(c) Radiofrequency and microwave	(d) Mic	rowave and r	adiofrequency
27.	The 2s orbital of H-atom has radia	al node at 2a <sub>0</sub> beca	use $\Psi_{2s}$ is p	roportional to
	(a) $\left(\frac{1}{2} + \frac{r}{a_0}\right)$ (b) $\left(2 + \frac{r}{a_0}\right)$	(c) $(2 -$	$\left(\frac{r}{a_0}\right)$	$(d)\left(2-\frac{r}{2a_0}\right)$
28.	Given that the mean speed of H <sub>2</sub> is	s 1.78 km s <sup>-1</sup> , the 1	nean speed o	of D <sub>2</sub> will be
	(a) $1.26 \text{ km s}^{-1}$ (b) $2.52 \text{ km s}^{-1}$	-1 (c) 5.40 ki	$m s^{-1}$ (d)	$3.17 \text{ km s}^{-1}$
29.	The triple point of water is	N=27-0015		
	(a) Depends on P but it is independe	ent of T (b	) Unique	
	(c) Depends on T but is independent	t of P (d	) Depends or	n both P and T
30.	Hydrolysis of Urea by urease is	ACH		
	(a) first order at high concentration of	of urea		
	(b) zero order at high concentration	of urea		
	(c) Independence of concentration o	f urea		
r	(d) first order with respect to both un	rea and urease		
	<u>Q.31 – Q.90 Multiple Choice</u>	Question (MCG	<u>), carry T</u>	WO marks each
	(for each wrong answer: – 2/	<u>/3).</u>		
31.	The rate exchange of cyanide ligation	nds in the following	g complexes	by <sup>14</sup> CN follow the
	order,	5 ( ) <b>7</b> 2		
	$[Ni(CN)_4]^{2-1}$	[Mn(CN) <sub>6</sub> ] <sup>3-</sup>	[ <b>Cr</b> (	CN) <sub>6</sub> ] <sup>3-</sup>
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	(a) $ii > i > iii$ (b) $iii > i > ii$ (c) $i > iii > ii$ (d) $i > ii > iii$
32.	Ligand field stabilization energies are smaller for lanthanides compared to transiti
	metals in the same oxidation state because
	(a) size of lanthanides ions are larger
	(b) $f$ orbitals interact less effectively with ligands
	(c) size of lanthanide ions are smaller
	(d) lanthanides favour oxygen donor ligands
33.	For the metal-olefin complexes (i) $[PtCl_3(C_2H_4)]^-$ and (ii) $[PtCl_3(C_2F_4)]^-$ , t
	correct statement is that
	(a) Carbon-carbon bond length is same in both (i) and (ii)
	(b) Carbon-carbon bond length in (i) is smaller compared to that of (ii)
	(c) Carbon-carbon bond length in (i) is larger compared to that of (ii)
	(d) A metallocycle is formed in each complex
34.	A solution containing 47 ppm of a compound-X (MW = 225) has a transmittance
	of 29.7 % in a 1.5 cm cell at 400 nm. The molar absorptivity in L mol <sup>-1</sup> cm <sup>-1</sup> is
	(a) $1.89 \times 10^3$ (b) $1.42 \times 10^3$ (c) $1.68 \times 10^3$ (d) $1.79 \times 10^3$
35.	The values of M-C stretching frequencies of the following compounds follows the
	trend
	$[V(CO)_6]^ [Cr(CO)_6]$ $[Mn(CO)_6]^+$
	i ii iii
	(a) $ii > i > iii$ (b) $ii > iii > i$ (c) $i > ii > iii$ (d) $iii > ii > ii$
36.	A substance undergoes a two-electron reversible reduction at dropping mercu
	electrode, and gives a diffusion current of 7.5 $\mu$ A. When the potential at t
	dropping mercury electrode is $-0.615 V$ , the current is $1.5 \mu A$ . The $E_{1/2}$ (in vo
	will be
	(a) $-0.683$ (b) $-0.674$ (c) $-0.652$ (d) $-0.633$
37.	The lanthanide complex that do not have <u>square antiprismatic</u> structure is
	(acac = acetylacetonate; phen = 1, 10-phennathrolin
	(a) $[Ce(NO_3)_6]^{2-}$ (b) $[La(acac)_3(H_2O)_2]$ (c) $[Ce(acac)_4]$ (d) $[Eu(acac)_3(Phere)_3(Phere)_3]$
38.	Among the following, the incorrect statement about SiC is that

(a) It is known as corundum

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- (b) It is prepared by reducing quartz with slight excess of coke in an electric furnace at 2000 2500 °C
- (c) Pure SiC is almost colourless or pale yellow
- (d) Its hardness is slightly less that diamond

#### 39. The incorrect statement about carboranes is that

- (a) Carbon tends to adopt the position of the lowest coordination number on the polyhedron
- (b) CH groups tend to be more positive than BH groups with the same coordination number
- (c) Carbon tends to keep as close as possible to other carbon atoms
- (d) Generally, arachno-carboranes are thermally less stable than the corresponding closocarboranes

#### 40. The incorrect statement for solid sodium chloride is that

- (a) Both sodium and chloride ions adopt inert gas configuration
- (b) The conduction band is full
- (c) The conduction band is empty
- (d) The valence band is full

<u>Q.41 – 48 required matching of items of column - I with the appropriate items in</u> <u>column - II. Choose the correct one from the alternatives (a), (b), (c) and (d).</u>

41.		Column - I	Xix.	Column - II
	<b>(P</b> )	Cytochrome	• <b>(I</b> )	Molybdenum
	( <b>Q</b> )	Calmodulin	( <b>II</b> )	Cobalt
	<b>(R)</b>	Chlorophyll	(III)	Magnesium
	<b>(S</b> )	Alcohol dehydrogenase	( <b>IV</b> )	Zinc
	<b>(T</b> )	N <sub>2</sub> Fixation	<b>(V)</b>	Iron
	(U)	Vitamin N <sub>12</sub>	(VI)	Calcium

	Р		Q		R		S		Т		U
(a)	V	;	VI	;	III	;	IV	;	Ι	;	II
(b)	II	;	III	;	IV	;	VI	;	V	;	Ι
(c)	III	;	IV	;	VI	;	Ι	;	II	;	V
(d)	IV	;	V	;	II	;	IV	;	Ι	;	III

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42.		Column -II Column -II
	<b>(P)</b>	Atomic absorption(I)Transition time
	( <b>Q</b> )	Chronopotentiometry (II) Cell constant
	<b>(R)</b>	Spectrophotometry (III) Coulomb
	<b>(S)</b>	Conductometry (IV) Molar absorptivity
		(V) Limiting current
		(VI) Hollow cathode lamp
		PQRS PQRS
	(a)	I ; III ; IV ; V (b) VI ; I ; IV ; II
	(c)	II ; III ; IV ; V (d) V ; VI ; II ; IV
43.		Column -I Column -II
	<b>(P</b> )	Wilkinson's catalyst (I) Trans -[IrCl(CO)(PPh <sub>3</sub> ) <sub>2</sub> ]
	(Q)	Speier's catalyst (II) Hydrosilylation
	<b>(R)</b>	Water gas shift catalyst (III) [RhCl(PPh <sub>3</sub> ) <sub>3</sub> ]
	<b>(S)</b>	Zeolite ZSM-5 catalyst (IV) Synthetic gasoline
	<b>(T)</b>	Vaska's complex (V) Hydroformylation
	<b>(U)</b>	$Co_2(CO)_8$ $CO_$
		P Q R S T U
	(a)	III ; II ; VI ; IV ; I ; V
	(b)	I ; V ; III ; IV ; VI ; II
	(c)	V ; II ; VI ; IV ; III ; I
	(d)	III ; VI ; IV ; II ; I ; V
44.		Column -I Column -II
	<b>(P</b> )	Ostwald process (I) Manufacture if Nickel
	( <b>Q</b> )	Solvay process (II) Manufacture of nitric acid
	<b>(R</b> )	Mond process (III) Manufacture of Na <sub>2</sub> CO <sub>3</sub>
	<b>(S)</b>	Frasch process (IV) Manufacture of H <sub>2</sub> SO <sub>4</sub>
	<b>(T</b> )	Contact Process (V) Manufacture of caustic soda
	<b>(U)</b>	Castner-Kellner Process (VI) Mining of elemental sulphur

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		Р		Q		R		S		Т		U							
	(a)	Ι	;	III	;	II	;	VI	;	IV	;	V							
	(b)	II	;	III	;	Ι	;	VI	;	IV	;	V							
	(c)	II	;	Ι	;	IV	;	V	;	III	;	VI							
	(d)	III	;	II	;	V	;	VI	;	Ι	;	IV							
45.				Col	um	n -I						Colu	mn -	II					
											(	v <sub>co</sub> ir	n cm	-1)					
	<b>(P)</b>	Су	clo	hexa	no	ne			(I	)		1800							
	(Q)	Су	clo	pent	and	one		G	(I	D 8	J	1715	2.						
	<b>(R)</b>	Су	clo	buta	noi	ne	$\sum_{i=1}^{n}$	11ª	(II	I)		1815	20						
	<b>(S</b> )	Су	clo	prop	oan	one		7/	(I	V)		1630	S)	3					
	<b>(T)</b>	Ac	id (	Chlo	rid	e 🕓	7		A	o)	F	1780	Å		ð				
	<b>(U)</b>	An	nid	e		ġ,	1	Q	(V	D)	R	1745	Ľ.		4				
							Ű	//		V	0	2	ÛŹ						
		Р		Q		R	Ž	S		T	_	U	Ĩ						
	(a)	Ι	;	II	;	ш	JÒ	ÍV	1- <b>;</b>	VI	7.;0	<b>W</b> 9							
	(b)	II	;	VI	;	V	;	III	;	, Ii	<b>?</b> ;	IV			A	,			
	(c)	VI	;	v	;	IV	;	III	;	П	;	I	1	3	D.				
	(d)	II	;	V	;	VI	;	ш	Ņ	I	;	IV							
46.				(	Colu	umn	-I			73				С	olum	ın -	II		
	<b>(P</b> )	Ma	any	elec	tro	n wa	ive	func	tio	n	<b>(I)</b>	Ac	liaba	atic	dem	ag	netiz	ati	on
	(Q)	Lo	w t	emp	era	ture	:			(	( <b>II</b> )	Sla	ater	det	ermi	na	nt		
	<b>(R)</b>	Me	ean	spee	ed					(	III)	) Pa	rtiti	on i	func	tior	1		
	<b>(S)</b>	Mo	olec	cular	· en	sem	ble			(	IV)	M	axwe	ellia	ın di	stri	ibuti	on	
		D		0		D		S					D		0		D		S
	<u>(a)</u>			<u>ү</u> т		<b>I</b>			_			(h)	т ТТ		ע ד				
	(a)	1 V	;	1	;	II T	;	111 137				(U)	II T	;	1	,	1 1	,	ш
	(c)	11	;	111	;	I	;	1V				(a)	1	;	IV	;	111	;	11

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	Column -I		Column -II
	(Spectral technique)		(Selection rule)
<b>(P)</b>	Rotational transition	<b>(I</b> )	$\Delta \mathbf{v} = \pm 1$
( <b>Q</b> )	Vibrational transition	<b>(II</b> )	$\Delta \mathbf{J} = -1$
<b>(R)</b>	Electronic transition in atoms	(III)	$\Delta \mathbf{J} = \pm 1$
<b>(S)</b>	NMR Spectroscopy	( <b>IV</b> )	$\Delta oldsymbol{l}=\pm oldsymbol{1}$
<b>(T)</b>	EPR Spectrum	<b>(V)</b>	$\Delta m_l = \pm 1$
(U)	P-Branch	(VI)	$\Delta \mathbf{m}_{\mathbf{s}} = \pm 1$



	P		Q		K		>		I		U
(a)	III	;	V	;	IV	;	Ι	;	II	;	VI
(b)	II	;	IV	;	Ι	;	III	;	VI	;	V
(c)	VI	;	V	;	IV	;	II	;	VI	;	III
(d)	VI	;	V	;	Ι	;	IV	;	II	;	III

49. The major product-P formed in the given reaction is

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50. The order of reactivity towards acid catalysed hydrolysis of the following cyclic acetals is:



- (a) An optically active compound with (R)-configuration
- (b) An optically inactive compound
- (c) A meso compound
- (d) An optically active compound with (S)-configuration
- 52. In the given reactions, identify the correct combination of their major products P and Q [LDA =  $LiN(^{i}Pr)_{2}$ ]



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53. The major stereoisomer obtains in the reaction of (S)-2-phenylpropanal with MeMgBr is:



54. The major product-P formed in the following reaction is:



55. Iodo-lactonization of  $\beta$ ,  $\gamma$ -unsaturated carboxylic acid X with  $I_2$  and NaHCO<sub>3</sub> gives.



56. The major stereoisomer-P obtained in the following reaction is:



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57. The major product-P of the following reaction is:



58. Cis and trans-2-methyl-5-t-butyl-1,3-dioxane each can exist as two conformers as shown below



The preferred conformations for Cis and Trans compounds will be

- (a) P, R (b) Q, S (c) P, S (d) Q, R
- 59. The major product-P formed in the given reaction is



60. The major product-P formed in the following photochemical reaction is:

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61. An organic compound having molecular formula C<sub>8</sub>H<sub>12</sub>O<sub>2</sub> exhibits the following peaks in IR and <sup>1</sup>H-NMR spectra.

IR : 1720(cm<sup>-1</sup>) <sup>1</sup>H-NMR : 6.95 (1H, d, J = 8.5 Hz), 5.90 (1H, d, J = 8.5 Hz), 4.53 (1H, q, J = 6Hz), 1.41 (3H, d, J = 6Hz), 1.20 (3H, s), 1.15 (3H, s)



- 62. The phase diagram of NaCl-H₂O is of simple eutectic type. The eutectic composition is 23.3 weight % NaCl and it freezes at −21.1 °C. The phases present in the solution containing 10 weight % NaCl at −20 °C are
  - (a) Ice + NaCl solution (b) Ice + solid NaCl
  - (c) NaCl + pure water (d) NaCl + saturated NaCl solution
- **63.** Hydrogen adsorption on a platinum surface is
  - (a) Endothermic with positive  $\Delta S$  and positive  $\Delta G$
  - (b) Endothermic with positive  $\Delta S$  and negative  $\Delta G$

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- (c) Exothermic with negative  $\Delta S$  and negative  $\Delta G$
- (d) Exothermic with positive  $\Delta S$  and negative  $\Delta G$
- 64. In the reversible chemical reaction taking place under standard condition at 298 K and 1 atm in a Daniel cell, Zn|Zn<sup>2+</sup><sub>(aq)</sub> || Cu<sup>2+</sup><sub>(aq)</sub> | Cu the heat change is:
  (a) Equal to ΔH<sup>0</sup>
  (b) Equal to TΔS<sup>0</sup>
  (c) Equal to zero
  (d) Equal to ΔU<sup>0</sup>
- 65. The orbital  $\Psi = \mathbf{1}_{\mathbf{S}_{\mathbf{H}_{A}}} \mathbf{1}_{\mathbf{S}_{\mathbf{B}}}$  of water belongs to the irreducible representation (a)  $A_1$  (b)  $B_1$  (c)  $A_2$  (d)  $B_2$
- 66. The vibrational partition function for a molecule with fundamental frequency (v) is given by

(a) 
$$\exp\left(-\frac{h\upsilon}{k_{B}T}\right)$$
  
(b)  $\left[1 - \exp\left(-\frac{h\upsilon}{k_{B}T}\right)\right]^{-1}$   
(c)  $\exp\left(-\frac{h\upsilon}{k_{B}T}\right) \left[1 - \exp\left(-\frac{h\upsilon}{k_{B}T}\right)\right]^{-1}$   
(d)  $\exp\left(-\frac{h\upsilon}{2k_{B}T}\right) \left[1 - \exp\left(-\frac{h\upsilon}{k_{B}T}\right)\right]^{-1}$ 

67. The internal pressure,  $\pi_{T} = T \left(\frac{\partial P}{\partial T}\right)_{V} - P$  for one mole of vander waals gas is: (a)  $\frac{a}{V^{2}}$  (b)  $\frac{a}{V^{2}} \left(\frac{RT}{V-b}\right)$  (c) zero (d)  $\frac{RT}{V-b}$ 

68. The gaseous sample on expose to total radiant energy of 6.626 J at 300 nm results in the photo-dissociation of 10<sup>-3</sup> mol of this sample. Assuming the sample absorbs all the light, the quantum yield for this photochemical reaction is:
(a) 6.023 (b) 0.602 (c) 60.230 (d) 0.060

- 69. If standard emf of the cell, Cu|Cu<sup>2+</sup> (aq) || [Cu(NH<sub>3</sub>)<sub>4</sub>]<sup>2+</sup>, aq. NH<sub>3</sub>|Cu is 0.35, then stability constant of the formation of cupric amine complex is
  (a) 1.0 x 10<sup>27</sup>
  (b) 8.4 x 10<sup>5</sup>
  (c) 7.0 x 10<sup>11</sup>
  (d) 4.3 x 10<sup>13</sup>
- 70.Standard entropy of crystalline carbon monoxide (in J/mol) at 0 K is around<br/>(a) 0.03(b) 2.50(c) zero(d) 5.76
- 71. Metals used in automobile catalytic converters are:
  (a) Pt and Pd
  (b) Pt and Rh
  (c) Pd and Rh
  (d) Rh and Ni
  Q.72 to 77 contains statement with reason and an Assertion. For each question, choose the correct answer from the given four choices:
- 72. Statement : The characteristic spectroscopic feature of the quadruply bonded  $[Re_2Cl_8]^{2-}$  a strong royal blue colour

0



Reason	:	This is due	to a	n absorpti	on band	l in visible region	due to	the
		excitation	of	electron	from	$\sigma^2\pi^4\delta^2$ ground	state	to
		$\sigma^2 \pi^4 \delta^1 \delta^{*1}$	excit	ted state				

#### **Assertion** : The transition is quantum mechanically allowed

- (a) Both Reason and Assertion are correct
- (b) Both Reason and Assertion are wrong
- (c) Reason is correct but Assertion is wrong
- (d) Reason is wrong but Assertion is correct
- 73. Statement : For the reason  $L_nMH \rightarrow L_nM^- + H^+$ , the important factors are the strength of the M-H bond and the nature of the ligand, L
  - **Reason** : The key here is the stability of the complex ion,  $L_nM^-$
  - Assertion : Weak  $\pi$ -bonding ligand will stabilize  $L_n M^-$  and so will disfavour the forward reaction
  - (a) Both Reason and Assertion are correct
  - (b) Both Reason and Assertion are wrong
  - (c) Reason is correct but Assertion is wrong
  - (d) Reason is wrong but Assertion is correct
- 74. Statement : D-Glucose and D-Mannose give the same phenylosazone
   Reason : Osazone formation results in a loss of the stereo-centre at C<sub>2</sub> but does not affect other stereo centres

#### **Assertion** : D-Glucose and D-Mannose are enantiomers

- (a) Both Reason and Assertion are correct
- (b) Both Reason and Assertion are wrong
- (c) Reason is correct but Assertion is wrong
- (d) Reason is wrong but Assertion is correct
- 75. Statement : Nucleosides are stable in dilute base but undergo hydrolysis in dilute acid
  - **Reason** : Nucleoside have an N-glycosidic linkage

Assertion : N-Glycosidic linkage behaves as O-glycosidic linkage which is rapidly hydrolysed by the aqueous acid but stable in aqueous base

(a) Both Reason and Assertion are correct

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- (b) Both Reason and Assertion are wrong
- (c) Reason is correct but Assertion is wrong
- (d) Reason is wrong but Assertion is correct
- 76. Statement : For the reaction  $NO + O_2 \rightarrow 2NO_2$  the rate constant is observed to decreases with temperature
  - Reason : As per the proposed mechanism, the first step is the dimerization of nitric oxide which is exothermic

#### Assertion : Rate law = $k_2 K [NO]_2 [O_2]$

- (a) Both Reason and Assertion are correct
- (b) Both Reason and Assertion are wrong
- (c) Reason is correct but Assertion is wrong
- (d) Reason is wrong but Assertion is correct
- 77. : Hydrogen gas gets warmer on expanding under isenthalpic Statement condition
  - Reason : Joule Thomson coefficient for hydrogen is -0.03 K/atm

: Attractive force are the dominant intermolecular interaction in Assertion hydrogen gas at 273 K

- (a) Both Reason and Assertion are correct -00193
- (b) Both Reason and Assertion are wrong
- (d) Reason is wrong but Assertion is correct <u>Common date for Q.78. Q 79. Q 75.</u>

Vapour pressure of water above pure liquid water 24, 259 and 760 torr respectively at 298 K, 363K and 373 K. Use these data to answer the question 78, 79 and 80.

- 78. Change in chemical potential (in KJ/mol) for the equilibrium  $H_2O_{(l)} = H_2O_{(g)}$  at 298K is
  - (a) 8.6 (b) -3.8(c) 7.87 (d) 3.72
- 79. Aqueous solution of sodium chloride ( $\chi_{NaCl} = 0.015$ ) at 298 K is in equilibrium with a water vapour pressure (in Torr) of (a) 23.64 (b) 748.60 (c) 24.36 (d) negligible
- **80.** Average value of enthalpy of vaporisation (in kJ/mol) of water between 363 and 373 K is:



	(a) 42.50	(b) 40.80	(c) -40.65	(d) -40.80
	Linked answer	<u>Q.81 and Q.82:</u>		
81.	As per Huckel	theory, $\pi$ -electron energy	v level of cyclobutadie	ne is
	(a) $\alpha$ + 2 $\beta$ , $\alpha$ +	$\beta$ , $\alpha - \beta$ , $\alpha - 2\beta$	(b) $\alpha + 2\beta$ , $\alpha - \beta$ ,	$\alpha - \beta$ , $\alpha - 2\beta$
	(c) $\alpha$ + 2 $\beta$ , $\alpha$ , $\alpha$ ,	$\alpha - 2\beta$	(d) $\alpha + \beta$ , $\alpha - \beta$ , $\alpha$	$\alpha - \beta, \alpha - 2\beta$
82.	Given that $\beta$ =	= -75 kJ/mol, cyclobuta	adiene is	
	(a) Paramagneti	c and its low absorption er	nergy is 150 kJ	
	(b) Paramagneti	c and its low absorption er	nergy is 75 kJ	
	(c) Diamagnetic	e an its lowest absorption e	nergy is 75 kJ	
	(d) Diamagnetic	e and its lowest absorption	energy is 150 kJ	
	Linked answer	for Q.83 and Q.84:	CAM CL	
83.	For the comple	ex ion[Cu(NH <sub>3</sub> ) <sub>6</sub> ] <sup>2+</sup> , the	coordination geometry	will be
	(a) Octahedral	(b) Tetr	agonally distracted octa	hedral
	(c) Trigonal pris	smatic (d) Trig	onal antiprismatic	
84.	The number of	possible d-d transition w	vill be	
	(a) One	(b) two (c)	) three (d)	) four
	Linked answer	Q.85 and Q.86;		
85.	The following	data is obtained with	GLC. Column temp	erature, 60 °C , inlet
	pressure, 1270	torr, outlet pressure, 7	70 torr, flow rate of	carrier gas at 25 °C.
	18 ml/min an	d retention time for air, O	. 30 min, the pressure	drop correction factor
	will be	ЧЕМ А	CAUP	
	(a) 0.648	(b) 0.740	(c) 0.770	(d) 0.715
86.	Corrected rete	<mark>ntion volume</mark> for air (in n	nL) will be	
	(a) 4.02	(b) 4.72	(c) 4.46	(d) 4.25
	Linked answer	for Q.87 and Q.88:		
87.	The major pro	duct-P of the following re	eaction is	
		0	NH <sub>2</sub>	
		F COOEt	Me OH	Р

0

 $\bigoplus$ 

ار OEt

F

F

ajchemacademy@gmail.com







88. Major product -Q obtained on reaction of 'P' with NaH in DMF is:



#### Linked answer for Q.89 and Q.90:

89. In the following sequence of reaction, the major product-Q is:



**90.** The major product on Sulphonation with H<sub>2</sub>SO<sub>4</sub> at 160 °C





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(c) SO<sub>3</sub>H



### Answer Key

Q.No	Ans		Q.No	Ans		Q.No	Ans		Q.No	Ans
1.	а		26.	d		51.	а		76.	а
2.	d		27.	С		52.	С		77.	С
3.	а		28.	а		53.	С		78.	С
4.	а		29.	b	0	54.	b		79.	а
5.	d		30.	С	TE	55.	d		80.	b
6.	а		31.	d	SPI C	56.	С		81.	С
7.	d		32.	b	-	57.	d		82.	а
8.	b		33.	b		58.	d	. 1	83.	b
9.	d		34.	С	K	59.	d	S	84.	а
10.	d		35.	С	1	60.	b	ſR	85.	b
11.	а		36.	d		61.	С	Y	86.	а
12.	b		37.	а		62.	а		87.	d
13.	С		38.	а		63.	С		88.	а
14.	d		39.	b		64.	b		89.	С
15.	b		40.	b		65.	b		90.	b
16.	С		41.	а	1VI-1 N-Z	66.	d			
17.	b	Å	42.	b	i.	67.	а	A		
18.	а		43.	а	E	68.	С	5		
19.	С		44.	b		69.	С			
20.	d		45.	b	ME	70.	d			
21.	b		46.	b		71.	С			
22.	b		47.	С	<i>7</i> 3.	72.	а			
23.	С		48.	d		73.	С			
24.	С		49.	d		74.	С			
25.	d		50.	а		75.	а			

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Tiruchirappalli – 620 024

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ajchemacademy@gmail.com

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