

Sample Paper MSc Chemistry

Q. N.	Question	Option A	Option B	Option C	Option D
1	Which of the following elements is used in some smoke detectors?	Iron	Cobalt	Americium	None of the above
2	Which of the following pair of elements belong to the 4d series of the periodic table?	V & Cr	Ru & Rh	Ta & W	Ce & Nd
3	Which of the following elements is not a transition element?	Zn	Cd	Hg	All of the above
4	Which of the following elements exhibit the highest oxidation state of 7?	Mn	V	Cu	None of the above
5	The highest melting point of any metal is exhibited by	Hg	W	V	None of the above
6	Which of the following elements are classified as toxic to the natural functions of biological systems?	Cd & Hg	Fe & Ca	Na & Zn	None of the above
7	Hydroxyapatite has the following molecular formula	$\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$	$\text{Ca}_8(\text{PO}_4)_8(\text{OH})_2$	$\text{Ca}_8(\text{PO}_4)_6(\text{OH})_4$	None of the above
8	The predominant extracellular cation in all animals & humans is	Potassium	Sodium	Magnesium	None of the above
9	The dietary deficiency of vitamin B ₁₂ leads to	Pernicious anemia	Dwarfism	Wilson's disease	All of the above
10	Ouch-Ouch' disease is associated with	Hg	Cd	both (a) & (b)	None of the above
11	Ethylenediamine (en) is classified as a _____ ligand	Bidentate	Monodentate	both (a) & (b)	None of the above
12	The oxidation state of Co in $[\text{CoCl}(\text{NO}_2)(\text{NH}_3)_4]^+$ is	+1	+3	+7	None of the above
13	The charge of cobalt in $\text{K}_2[\text{Co}(\text{NH}_3)_2\text{Cl}_4]$ is	+2	+4	+6	None of the above
14	The t _{2g} set consists of the following orbitals	d_{xy}, d_{yz}, d_{xz}	$d_{xy}, d_{x^2-y^2}, d_z^2$	$d_{yz}, d_{xz}, d_{x^2-y^2}$	$d_{xz}, d_z^2, d_{x^2-y^2}$
15	cis-platinum & trans-platinum are examples for _____ isomers	Geometrical	Optical	Hydrate	None of the above
16	Quantum model of the atom was proposed by	John Dalton	Erwin Schrodinger	J.J. Thomson	None of the above

17	The portion of the electromagnetic spectrum visible to human eye is	1m - 10 m	0.01 nm - 0.1 nm	400 nm - 700 nm	0.01 cm - 0.1 cm
18	The bending of a wave as it passes through a small opening (or) by the edge of an object is termed as	Interference	Diffraction	both (a) & (b)	None of the above
19	Heisenberg's principle is expressed by the following equation	$E = hv$	$\Delta X \Delta P \geq h/4\pi$	$\Delta X \Delta P \leq h/4\pi$	None of the above
20	Canal rays were discovered by	Robert Millikan	E. Goldstein	Max Planck	Alfred Werner
21	The wavelength of a violet light is 400 nm. Calculate its wavenumber	$25 \times 10^5 \text{ m}^{-1}$	$25 \times 10^4 \text{ m}^{-1}$	$7.5 \times 10^2 \text{ sec}^{-1}$	None of the above
22	What is the minum energy that photons must possess in order to produce photoelectric effect with platinum metal if the threshold frequency of platinum is $1.3 \times 10^{15} \text{ sec}^{-1}$	$9.6 \times 10^{-12} \text{ erg}$	$8.6 \times 10^{-12} \text{ erg}$	$10.6 \times 10^{-12} \text{ erg}$	None of the above
23	The Lyman spectral series of hydrogen falls in	Visible	Far-IR	Infrared	Ultraviolet
24	How are the following species related ${}_6\text{C}^{14}$, ${}_7\text{N}^{15}$, ${}_8\text{O}^{16}$?	Isotopes	Isobars	Isotones	None of the above
25	The wavelength of blue light with a frequency of $6.4 \times 10^{14}/\text{sec}$ is	$3.7 \times 10^{-7} \text{ m}$	$4.7 \times 10^{-7} \text{ m}$	$5.7 \times 10^{-7} \text{ m}$	None of the above
26	The name of the orbital with quantum numbers $n = 4$ & $l = 1$ is	3s	4p	4d	None of the above
27	Which of the following elements Mg, Cl & Na has the largest atomic radius?	Na	Mg	Cl	None of the above
28	The wavelength of an α -particle having mass of $6.6 \times 10^{-27} \text{ kg}$ moving with a speed of 10^5 cm sec^{-1} ($h = 6.6 \times 10^{-34} \text{ kgm}^2\text{sec}^{-1}$) is	$1 \times 10^{-10} \text{ m}$	$2 \times 10^{-10} \text{ m}$	$3 \times 10^{-10} \text{ m}$	None of the above
29	The uncertainty in the position & velocity of a particle are 10^{-10} m & $5.27 \times 10^{-24} \text{ msec}^{-1}$ respectively. The mass of the particle is	10 gms	100 gms	1000 gms	None of the above

30	The type of chemical bonding present in diamond is	Ionic	Co-ordinate covalent	Covalent	None of the above
31	Ultra-pure germanium can be obtained by	Kroll's process	Zone refining	both (a) & (b)	None of the above
32	The Kroll's process is used to produce	Copper	Magnesium	Titanium	None of the above
33	Nickel can be refined by	Melting	Mond's process	both (a) & (b)	None of the above
34	Which of the following is a better reducing agent for ZnO?	Carbon	CO	both (a) & (b)	None of the above
35	The other name for noble gases is	Reactive gases	Inert gases	Hot gases	None of the above
36	Which nobel gas is used in light displays?	Neon	Argon	Krypton	Helium
37	Xe reacts with fluorine in a ratio of 1:5 at a temp of 873 K to form	XeF ₆	XeF ₄	XeF ₂	XeOF ₄
38	Which of the following has a linear shape?	XeF ₄	XeF ₂	XeO ₃	XeOF ₄
39	What is the hybridisation of Xe in XeO ₃ ?	sp ³	sp ³ d	sp ³ d ³	dsp ²
40	Which of the following elements has the maximum number of chemical compounds?	Kr	He	Xe	Ar
41	Diborane is an example for a	Monomer	Dimer	Trimer	None of the above
42	Which of the following is an electron deficient compound?	(BH ₃) ₂	PH ₃	(CH ₃) ₂	None of the above
43	HClO is known as	Hypochlorous acid	Chloric (I) acid	Chloranol	All of the above
44	Which of the following is a pseudohalogen?	C ₂ N ₂	Cl ₂	ClF ₃	None of the above
45	The molecular formula of boric acid is	H ₃ BO ₃	B ₂ H ₆	[B ₁₀ H ₁₀] ²⁻	None of the above
46	Diborane & ammonia are required in one of the following ratio to prepare borazine	6:9	1:2	1:3	3:4
47	Which of the following are the major components of Syngas?	CO & H ₂	CH ₄ & H ₂	CO ₂ & H ₂	CO ₂ & CH ₄
48	Which of the following is a double salt?	KClMgCl ₂ .6H ₂ O	K ₄ [Fe(CN) ₆]	K ₃ [Fe(CN) ₆]	K ₂ [HgI ₄] ²⁻

49	Ziese's salt is a _____ complex	Metal-alkane	Metal-alkene	Metal-alkyne	None of the above
50	Which of the following catalysts is used in Fischer-Tropsch synthesis	Ni	Alumina	ZnO	Th
51	Wacker process is used to produce	Methanal	Ethanal	Benzaldehyde	None of the above
52	Chromium hexacarbonyl is a _____ carbonyl	Homoleptic	Heteroleptic	both (a) & (b)	None of the above
53	Which of the following metals form a polynuclear carbonyl?	K	Na	Mn	None of the above
54	Pentacarbonyliron (0) exhibits the following geometry	Square planar	Octahedral	Trigonal bipyramidal	Tetrahedron
55	The principle of IR spectroscopy is based on the principle of	Polarization	Dipole moment	both (a) & (b)	None of the above
56	Mid-IR region consists of the following region	4000 - 100 cm ⁻¹	4000 - 400 cm ⁻¹	400 - 100 cm ⁻¹	14000 - 4000 cm ⁻¹
57	The catalyst used in the manufacture of polythene by Ziegler-Natta method is	TiCl ₄ & (C ₆ H ₅) ₃ Al	TiCl ₄ & (C ₂ H ₅) ₃ Al	TiCl ₄ & (CH ₃) ₃ Al	None of the above
58	A reaction mechanism in which an intermediate of reduced coordination number is formed by the departure of a leaving group is known as _____ mechanism	Associative	Dissociative	Interchange	None of the above
59	The rate determining step in octahedral complex substitution is due to _____ step	Associative	Dissociative	Interchange	None of the above
60	The weak field ligands are responsible for _____ complex formation	Low spin	High spin	No spin	None of the above
61	The value of lambda max in the absorption spectrum of 1,3-butadiene is:	217 nm	317 nm	417 nm	None of the above
62	UV/Visible spectroscopy is based on:	Vibrational Excitation	Electronic excitation	Nuclear Excitation	Rotational Excitation

63	Which of the following statements is not true regarding ultraviolet/visible spectroscopy?	As the extent of conjugation in a molecule increases, $\lambda(\max)$ increases.	As the extent of conjugation in a molecule increases, the HOMO-LUMO gap increases.	The ultraviolet/visible region of the electromagnetic spectrum ranges from 200 – 800 nm.	The amount of UV light absorbed by a compound can be expressed by its molar absorptivity.
64	The electronic transition that occurs for conjugated molecules in ultraviolet/visible spectroscopy is:	$\sigma \rightarrow \pi^*$	$\sigma \rightarrow \sigma^*$	$\pi \rightarrow \pi^*$	$\sigma^* \rightarrow \pi^*$
65	An IR spectrum is a plot of percentage of transmittance of IR radiation against	Wavelength	Wavenumber	Frequency	None of the above
66	Which of the following is related to IR spectroscopy?	Change in dipole moment	Electronic excitation	Nuclear spin	All of the above
67	Cis-but-2-ene and trans-but-2-ene are:	Geometrical isomers	Optical isomers	Chain isomers	Position isomers
68	When proton NMR spectrum of ferrocene is recorded, it gives:	one signal	two signals	three signals	four signals
69	Molecular formula of an organic compound is C_5H_{12} . It gives only one signal in its proton NMR spectrum. This compound is:	Neo-pentane	n-Pentane	2-Methylbutane	None of the above
70	The ligands are:	Lewis acids	Lewis bases	Organometallic compounds	None of the above
71	Cyclopentadienyl anion is:	Aromatic	Nonaromatic	Aliphatic	None of the above
72	The spectroscopic technique, which is used for the characterization of metal carbonyls, is:	IR Spectroscopy	UV-Vis Spectroscopy	NMR Spectroscopy	Atomic Absorption Spectroscopy
73	Which of the following metals is used as a catalyst?	Sodium	Potassium	Calcium	Palladium
74	Variable transition state is the characteristic of	Transition metals	Alkali metal	Alkaline earth metals	None of the above
75	Sandwich structure is shown by	Nickel tetracarbonyl	Ferrocene	Zinc chloride	None of the above
76	Ferrocenium cation is a strong:	Oxidising agent	Reducing agent	Nucleophile	Donor ligand
77	Which of the following is a six-electron donor ligand?	CO	H_2	Benzene	Cyclopentadienyl anion

78	Among vinylic cation, benzylic cation and allylic cation, the most stable one is:	Vinylic cation	benzylic cation	allylic cation	None of the above
79	When two molecules of same or different reactants combine to give a new product with the elimination of simple byproducts like water or ammonia, such a reaction is known as:	Condensation reaction	Elimination reaction	Substitution reaction	Rearrangement
80	Which of the following is the most effective group in stabilizing a free radical inductively?	F	Br	I	Cl
81	Which of the following is not a nucleophile?	Cyanide ion	Hydroxyl ion	RNH ₂	BF ₃ (Boron trifluoride)
82	Which of the following is the correct order regarding -I effect of the substituents?	-NR ₂ > -OR > -F	-NR ₂ > -OR < -F	-NR ₂ < -OR < -F	-OR > -NR ₂ > -F
83	Which is stronger base between methanol and methyl amine?	Methanol	Methyl amine	Both have equal basicity.	Both are acidic in nature.
84	Wurtz reaction is a:	C-C coupling reaction	C-N coupling reaction	C-O coupling reaction	C-S coupling reaction
85	Which of the following will be preferred product of monochlorination of propane?	2-Chloropropane	1-Chloropropane	1,2-Dichloropropane	1,1-Dichloropropane
86	Elimination reactions lead to the formation of:	Alkanes	Alkenes	Alkynes	Arenes
87	Among primary alcohol, methyl alcohol, tertiary alcohol and secondary alcohol, which undergoes dehydration reaction with maximum ease:	Primary alcohol	Secondary alcohol	Tertiary alcohol	Methyl alcohol
88	When an alkyl halide undergoes elimination reaction via E1 (Unimolecular) mechanism, the reaction intermediate is:	Carbocation	Carbanion	Free Radical	None of the above

89	What chemical tests would you use to distinguish between two unlabelled bottles containing hexane and hex-1-ene respectively?	2,4-DNP Test	Bromine Water Test	Calcium carbide test	None of the above
90	Which of the following is having acidic hydrogen?	Metane	Ethene	Ethyne	Benzene
91	Which is true in context of the energies of the chair and boat forms of cyclohexane?	The chair forms of cyclohexane are 7 kcal/mol more stable than the boat forms.	The chair forms of cyclohexane are 70 kcal/mol more stable than the boat forms.	The boat forms of cyclohexane are 7 kcal/mol more stable than the chair forms.	The chair forms and boat forms of cyclohexane have similar energies.
92	Which of the following is necessary for a polyene to be completely conjugated?	It must have $4n+2$ pi electrons	It must be planar	All the $4n+2$ pi electrons must be in a closed conjugated cyclic loop	All of the above
93	Benzene has C=C bonds. However, it does not undergo addition reactions because	It has aromaticity	The C=C bonds are conjugated	It is a unique compound	None of the above
94	Among ethylene, but-2-ene, 2,3-dimethylbutene, styrene and $\text{CH}_2=\text{CH}-\text{CF}_3$, which compound will show the least reactivity towards electrophilic addition reactions?	Ethylene	But-2-ene	2,3-Dimethylbutene	$\text{CH}_2=\text{CH}-\text{CF}_3$
95	During nitration of benzene, a mixture of conc. nitric acid and conc. sulphuric acid is used because	Conc. sulphuric acid increases the rate of reaction by increasing the concentration of the electrophile	Conc. sulphuric acid increases the rate of reaction by removing water from the reaction mixture	Conc. Sulphuric acid makes the mixture homogeneous	All of the above
96	Which of the following exists in Chair and Boat form?	Ferrocene	Cyclohexane	n-Hexane	Butane
97	Passing phenol vapours over heated zinc dust leads to the formation of	Zinc phenoxide	Benzene	Diphenyl ether	None of the above
98	For an alkyl halide to undergo elimination via the E2 mechanism,	The H and X groups must be antiperiplanar.	The H and X groups must be perpendicular.	The H and X groups must be horizontal.	The H and X groups must be geminal.

99	In case of methylcyclohexane, chair chair interconversion occurs, but at any instant more than 90% of the molecules have their methyl group equatorial. The reason is associated with:	1,3-Diaxial interaction	Higher stability of chair form	Higher stability of the boat form	None of the above
100	Which of the following bases is strong enough to completely deprotonate propyne?	Ammonia	Methyl alcohol	Sodium amide	NaOH