M.Sc. Chemistry

Q. No.	Question	Option A	Option B	Option C	Option D
1	The least acidic in the series BF_3, BCl_3 and BBr_3 is BF_3 because-	F is more electronegative	F has a small size	B3+ has a very small size	Back donation of electrons from F to B
2	Vitamin B12 is the coordination compound of	Mg	Co	Fe	Zn
3	The type of hybridization of carbon in fullerene is	sp	sp2	sp3	sp3d2
4	Which of the following is isostructural and isoelectronic with XeF_2	CO2	IF_2^-	C_2H_2	All of these
5	The Hybridization in XeF_6, XeF_4 is	Sp^3, sp^3d^2	Sp^3d^2, sp	Sp^3d^3, sp^2	Sp^3d^3, sp^3d
6	The STYX code for diborane is	2020	2200	2002	0220
7	Which of the following is the weakest Lewis base	CH_3^-	NH_2^-	OH^-	F^-
8	Shape of XeOF4	Octahedral	Square Pyramidal	Pyramidal	T-Shaped
9	Which of the following has the highest catenation power	O	S	Se	Te
10	The elements $^{30}Si_{14,}$ $^{31}P_{15,}$ and $^{33}S_{16,}$ are called	Isotopes	Isobars	Isotones	Radioactive elements

11	Loss of β particle is equivalent to	Increase of one proton	Decrease of one neutron	Combination of both a and b	None of these
12	The proper rays for radiocarbon dating is	UV Rays	IR rays	Cosmic rays	X-rays
13	John Teller effects the geometry of	$[Ni(NH_3)_6]^{2+}$	$[Cu(NH_3)_6]^{2+}$	$[MnCl_4]^{2+}$	None of these
14	Which of the following act as π-acid ligand	F^-	O_2^-	NH_3	CO
15	The CFSE for a high spin octahedral complex having d1 configuration is	-0.6 Δo	-0.8 Δo	-0.4 Δo	0.00 Δo
16	Hemoglobin, a complex containing iron is a constituent of blood. The oxidation state of iron in the complex is	Zero	+1	+2	3
17	In the compound, $LiAlH_4$, the ligand is	H+	H^-	H	NONE of these
18	The oxidation number of cobalt in K[Co(CO)4] is	+1	-1	+3	-3
19	Which of the following is expected to be a paramagnetic complex	$[Ni(H_2O)_6]^{2+}$	$[Ni(CO)_4]$	$[Zn(NH3)_4]^{2+}$	$[Co(NH3)_6]$
20	In the octahedral ligand field theory, the 3d orbitals will be split into	Two levels	Three levels	Four levels	Five levels

21	In the spectrochemical series, which ligand produces strong field	Cl^-	H_2O	NO_2^-	CO
22	Which of the following is non-degradable pollutant	Garbage	Rubbish	Sludge	Phenolics
23	Minimata disease is caused by	Hg	Lead	Zn	Fe
24	Which of the following represents a d-block element	[Rn] $4f^{14}$ $6d^1$ $7s^2$	[Xe] $4f^{14}$ $5d^1$ $6s^2$	[Xe] $4f^1$ $5d^1$ $6s^2$	[Xe] $5d^1$ $6s^2$
25	Greater the value of electron affinity of an element, greater is its	Coordination power	Electropositive character	Electronegative character	None
26	Carbyl amine test is performed in alcoholic KOH by heating a mixture of	Chloroform an alcohol	Chloroform and a primary amines	An alkyl halide and primary amines	an alkyl cyanide and primary amine
27	Hinsberg's reagent is	Benzene sulphonyl chloride	Phenyl isocyanide	*p* - toluene-sulphonic acid	*o* -dichlorobenzene
28	Cope reaction is	SN^1 intramolecular	SN^2 intramolecular	E_1 intramolecular	E_C and Ei intramolecular
29	The number of double bonds present in carotene is	5	10	11	18
30	Choose the right statement	Homoannular diene is called as transoid	Cisoid shows less intense absorption	The base value of transoid is 214 nm	Exocyclic double bond causes a bathochromic shift of 30 nm

31	Select the correct IUPAC name for: $(CH_3)_2CHCH(OH)CH_2C(CH_3)_3$	2,5,5-trimethyl-3-hexanol	1,1,4,4-pentamethylbutanol	1,1-dimethylisopentanol	2,5-dimethyl-4-hexanol
32	The hybridization of carbon atoms in alkanes is	sp	sp^2	sp^3	sp^3d
33	Titration is	Titrimetric analysis	Volumetric analysis	Gravimetric analysis	All of these
34	Which of the following is a permanent electron displacement effect?	Inductomeric	Electromeric	Inductive	All of the above
35	Which of the following analytical method is used to measure the analyte concentration depending on the quantity of light received by the analyte?	Spectroscopy	Chromatography	Potentiometery	Polarography
36	In an infrared (IR) spectrum, which of the following functional groups has the highest frequency?	Ketone	Aldehyde	Ester	Alcohol
37	In which chromatography stationary phase is more polar than mobile phase?	Ion exchange chromatography	Normal phase chromatography	Reversed chromatography	Size exclusion chromatography
38	Which of the following is an example of bulk property or general detector in HPLC	Fluorescence detector	Refractive index detector	Electrochemical detector	UV-Visible detector
39	The base peak in mass spectrum is?	The lowest mass peak	The peak corresponding to the parent ion	The highest mass peak	The peak set to 100% relative intensity

40	In a chromatographic separation, which of the following is most appropriate for the qualitative analysis of a substance?	Taking factor	Capacity factor	Retention factor	Resolution
41	Which of the following is not in the Beer's Law equation?	molar absorptivity	cell path length	light wavelength	concentration
42	Cyclopropenyl cation and cyclopentadienyl anion are:	Aromatic and anti-aromatic	Both are aromatic	Both are anti-aromatic	Anti-aromatic and aromatic
43	In anti-morkonikoff rule, reaction follows:	Free radical substitution	Electrophilic addition	Free radical addition	Nucleophilic addition
44	Photochemical smog differs from industrial smog in that it:	Is formed in the presence of sunlight	Has large quantities of soot	Is primarily composed of CO	Consist of primary pollutants
45	Protein are made up of……..	Sugars	amino acids	fatty acids	nucleic acids
46	Which of the following is an example of C-4 Epimers?	Glucose & Ribose	Glucose & Galactose	Galactose, Mannose & Glucose	Glucose, Ribose & Mannose
47	Identify the compound with the highest ring strain.	Cyclomethane	Cyclopropane	Cyclobutane	Cyclopentane
48	What is the concentration, in ppm, if 0.025 g of KCl is dissolved in 100 grams of water?	4×10^{3} ppm	250 ppm	2.5×10^{-4} ppm	2.5 ppm
49	Three unknown solutions are given with pH value of 6, 8 & 9.5 respectively. Which solution will contain the maximum OH^- ion?	Solution sample-1	Solution sample-2	Solution sample-3	All the above

50	When 1,3 butadiene reacts with alkene, the reaction known as:	Friedel-craft reaction	Diels alder reaction	Sandemayer reaction	Wurtz fittig reaction
51	Which of the following is used as an indicator in the titration of a strong acid and a weak base?	Methyl orange	Phenolphthalein	Thymol blue	Fluorescein
52	Alkyl halides can be converted into Grignard reagents by	Boiling them with Mg ribbon in alcoholic solution	Warming them with magnesium powder in dry ether	Refluxing them with $MgCl_2$ solution	Warming them with $Mgcl_2$
53	Based on saytzeff's rule, select the most stable alkene:	1-methylcyclohexane	3-methylcyclohehane	4-methylcyclohehane	They are all of equal stability
54	When acids react with metal oxide it produces	water and salt	salts and hydrogen gas	salts only	a) no reaction takes place
55	Which theory explain the reactivity and stability of cycloalkanes	Valence bond theory	Molecular orbital theory	Bayer strain theory	VSEPR theory
56	Which one of the following is necessary for mass spectrometry to occur?	Loss of an electron	Change of alignment of a proton in a magnetic field	A molecular vibration	Excitation of an electron from the ground state to a higher energy state
57	HPLC is an abbreviation for?	High Profit Liquid Chromatography	High Performance Liquid Chromatography	Higher Pressure Low Chromatography	Higher Profit Low Chromatography
58	The largest portion of atmospheric gases by weight is:	Oxygen	Ozone	Nitrogen	Sulfur

59	Which of the following is primary halide?	Isopropyl iodide	Secondary butyl iodide	Tertiary butyl iodide	Neohexyl chloride
60	The photon of wavelength 400 nm corresponds to _____ wave number.	20000 cm^{-1}	25000 cm^{-1}	40000 cm^{-1}	None of the above
61	Signal splitting in NMR arises from?	Shielding effect	Spin-spin decoupling	Spin-spin coupling	Deshielding effect
62	The number of delocalised electrons in the benzene ring are π	6	8	2	3
63	Grignard reagent behaves as:	Strong base	Strong acid	Both of these	none of the above
64	Which of the following ions typically has the highest mobility in aqueous solutions?	Hydrogen ion (H+)	Sodium ion (Na+)	Chloride ion (Cl-)	Sulfate ion (SO42-)
65	Which of the following ions typically has the highest mobility in solid-state electrolytes?	Lithium ion (Li+)	Potassium ion (K+)	Sodium ion (Na+)	Calcium ion (Ca2+)
66	What is the transference number of an ion in a solution?	The ratio of the ionic conductance of the ion to the total conductance of the solution	The total conductance of the ion in the solution	The ratio of the molar concentration of the ion to the total concentration of ions in the solution	The ratio of the ion's mobility to the total mobility of ions in the solution

67	What is ferromagnetism?	The temporary magnetization of a material in the presence of an external magnetic field	The ability of a material to retain its magnetization after the external magnetic field is removed	The weak attraction of a material to an external magnetic field	The absence of any magnetic properties in a material
68	What is paramagnetism?	The temporary magnetization of a material in the presence of an external magnetic field	The ability of a material to retain its magnetization after the external magnetic field is removed	The weak attraction of a material to an external magnetic field	The weak repulsion of a material from an external magnetic field
69	What is the Curie temperature?	The temperature at which a material becomes ferromagnetic	The temperature at which a material becomes paramagnetic	The temperature at which a material loses its magnetic properties	The temperature at which a material exhibits maximum diamagnetism
70	Which of the following materials is most effective in shielding against beta particles?	Lead	Aluminum	Concrete	Plastic
71	What is the primary mechanism of interaction between alpha particles and matter?	Photoelectric effect	Compton scattering	Elastic scattering	Ionization
72	What is the main function of enzymes in living organisms?	Providing energy for cellular processes	Facilitating communication between cells	Catalyzing biochemical reactions	Maintaining cell structure and shape
73	What is ionic conductance?	The ability of a substance to conduct electricity	The movement of ions in an electrolyte solution	The resistance of a substance to electric current	The flow of electrons in a metallic conductor
74	What is the repeating unit in polyethylene?	CH4	CH2	C2H4	CH3

75	Which of the following is a thermosetting polymer?	Polyethylene	Polypropylene	Bakelite	Polyvinyl chloride (PVC)
76	Which of the following is true regarding the solution to the Schrödinger Equation for the hydrogen atom?	It gives the exact position of the electron.	It predicts the probability of finding the electron at different locations.	It determines the speed of the electron.	It only describes the behavior of electrons in the ground state.
77	Which physical quantity does the Schrödinger Equation describe?	Momentum	Energy	Position	All of the above
78	Which of the following is not a synthetic polymer?	Polyethylene	Polypropylene	Cellulose	Polyvinyl chloride (PVC)
79	What type of polymerization involves the elimination of small molecules such as water or alcohol?	Addition polymerization	Condensation polymerization	Free radical polymerization	Ionic polymerization
80	What is the standard electrode potential of hydrogen (H2) gas at standard conditions?	+0.00 V	+0.34 V	+0.76 V	-0.34 V
81	What is the function of a salt bridge in an electrochemical cell?	It completes the circuit and allows for the flow of current.	It prevents mixing of the electrolytes in the two half-cells	It facilitates the movement of ions to maintain charge neutrality.	It increases the voltage of the cell.
82	What is the phase rule?	A rule that describes the relationship between the number of phases, components, and degrees of freedom in a system at equilibrium	A rule that determines the rate of phase transitions in a system	A rule that governs the behavior of phases in non-equilibrium conditions	A rule that predicts the critical temperature of a substance

83	What does the critical point on a phase diagram represent?	The temperature and pressure at which all phases coexist in equilibrium	The highest temperature at which a substance can exist in the liquid phase	The temperature and pressure above which distinct liquid and gas phases cease to exist	The lowest temperature at which a substance can exist in the solid phase
84	Which of the following statements regarding chair cyclohexane is wrong?	The dihedral angle of the two axial bonds on adjacent carbons is 180°.	The dihedral angle of the two equatorial bonds on adjacent carbons is 60°.	The dihedral angle between the axial bond and the equatorial bond on adjacent carbons is 120°.	The axial hydrogen atoms on C1, C3, and C5 form an equilateral triangle (as do C1, C3, and C5 themselves and the equatorial hydrogens on them).
85	What does it mean if a reaction is spontaneous?	It occurs rapidly	It occurs without any external influence	It occurs with the release of heat	It occurs without any change in entropy
86	Which of the following reactions is likely to be spontaneous at room temperature?	$\Delta H = 50$ kJ/mol, $\Delta S = 100$ J/mol·K	$\Delta H = -30$ kJ/mol, $\Delta S = -50$ J/mol·K	$\Delta H = -20$ kJ/mol, $\Delta S = 40$ J/mol·K	$\Delta H = 10$ kJ/mol, $\Delta S = -30$ J/mol·K
87	A reaction is said to be first-order with respect to a reactant if:	The rate of the reaction is directly proportional to the concentration of that reactant	The rate of the reaction is inversely proportional to the concentration of that reactant	The rate of the reaction doubles when the concentration of that reactant is doubled	The rate of the reaction remains constant regardless of the concentration of that reactant
88	Chromatography is	Separation technique	Identification technique	Both A and B	None of the above
89	In the photosynthesis, the predominant metal present in the reaction centre of photosystem II is	Zn	Cu	Mn	Fe

90	Which of the following molecules does not have a dipole moment?	CH3Cl	CH2Cl2	CHCl3	CCl4
91	Shifting of electron of a multiple bond under the influence of a reagent is called:	I- effect	E-effect	M-effect	Hyperconjugation
92	Which of the following compounds is isomeric with methyl vinyl ether	Propanal	1-propanol	Ethyl methyl ether	Ether
93	The reactive intermediate in the Reimer- Tiemann reaction is	The formyl anion	The formyl carbocation	Dichlorocarbene	Dichloromethyl carbocation
94	The correct decreasing order of priority of functional groups in naming an organic compound as per IUPAC system of nomenclature is:	—COOH >—$CONH_2$ >—COCl >—CHO	—SO_3H >—COCl >—$CONH_2$ >—CN	—COOH >—COCl >—NH_2 > >C = 0	—COOH >—COOR >—$CONH_2$ >—COCl
95	The number of configurational isomers of 2,3-dibromocinnamic acid is:	4	3	2	1
96	The electrophilic aromatic substitution proceeds through a-	Free radical	Sigma complex	Benzene	Carbene
97	The number of vibrational degree of freedom in $C_6H_5CH_3$ will be-	39	15	18	40
98	$R\text{-}CO\text{-}N_3$ + Heat/ $H_2O \rightarrow R\text{-}NH_2$ is an example of	Hofmann rearrangement	Lossen rearrangement	Beckmann rearrangement	Curtius rearrangement
99	In which of the following organic species all the carbon atoms are in the same hybrid state?	$CH_2=C=CH_2$	CH_3 —$^+$CH—CH_3	CH_3—C≡CH	CH_2=CH—$^+CH_2$

100	In which of the following compounds C—H bond length is minimum?	ethane	ethene	1,2-dichloroethene	1,2-dichloroethane