

T.Y.B.Sc. Sem. – VI
Sample Questions
Inorganic Chemistry Paper - II

1. The purest form of iron is... *
 - a. cast iron
 - b. pig iron
 - c. wrought iron
 - d. steel

2. In the extraction of chlorine by electrolysis of brine..... *
 - a. oxidation of Cl^- ion to chlorine gas occurs.
 - b. reduction of Cl^- ion to chlorine gas occurs.
 - c. For the overall reaction, ΔG° has a negative value.
 - d. a displacement reaction takes place.

3. In the extraction of copper from its sulphide ore, the metal is formed by the reduction of Cu_2O with..... *
 - a. FeS
 - b. CO
 - c. Cu_2S
 - d. SO_2

4. Choose the correct option of temperature at which carbon reduces FeO to iron and produces CO. *
 - a. Below temperature at point A.
 - b. Approximately at the temperature corresponding to point A.
 - c. Above temperature at point A but below a temperature at point D.
 - d. Above temperature at point A.

5. Below point 'A' FeO can.... *
 - a. be reduced by carbon monoxide only.
 - b. be reduced by both carbon monoxide and carbon.
 - c. be reduced by carbon only.
 - d. not be reduced by both carbon and carbon monoxide.

6. Which of the following statements is correct about the role of substances added in the froth floatation process? *
 - (i) Collectors enhance the wettability of the metal particles.
 - (ii) Collectors enhance the wettability of gangue particles.
 - (iii) By using depressants in the process two sulphide ores can be separated.
 - (iv) Froth stabilisers decrease wettability of gangue.

7. In the Froth Flotation process, zinc sulphide and lead sulphide can be separated by *
- (i) using collectors.
 - (ii) adjusting the proportion of solvent to water.
 - (iii) using depressant.
 - (iv) using froth stabilisers.
8. Common impurities present in bauxite are..... *
- a. CuO
 - b. ZnO
 - c. MgO
 - d. SiO₂
9. Which of the following ores are concentrated by froth flotation? *
- a. Haematite
 - b. Galena
 - c. Copper pyrites
 - d. all of these
10. The main reactions occurring in blast furnace during extraction of iron from haematite are...
- a. $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
 - b. $\text{FeO} + \text{SiO}_2 \rightarrow \text{FeSiO}_3$
 - c. $\text{Fe}_2\text{O}_3 + 3\text{C} \rightarrow 2\text{Fe} + 3\text{CO}$
 - d. $2\text{FeS}_2 + 11/2 \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 + 4\text{SO}_2$
11. Ferrocene cannot undergo which of the following reaction? *
- a) Friedal craft acylation
 - b) Diels-Alder reaction
 - c) Oxidation by Ag + ions
 - d) Electrophilic substitution
12. Which of the following statement is not true about ferrocene? *
- a) decamethyl ferrocene is staggered in solid state
 - b) cyclopentadienyl rings in ferrocene are almost eclipsed
 - c) cyclopentadienyl ring in ferrocene are staggered
 - d) ferrocene can be nitrated by reaction with dil. HNO₃
13. Which of the following is not considered as an organometallic compound? *
- a) Ferrocene
 - b) Cis-platin
 - c) Ziese's salt
 - d) Grignard reagent
14. Coordination number of Fe in ferrocene is *
- a. 10
 - b. 8
 - c. 6
 - d. 2

15. Which statement about ferrocene is incorrect? *
- I₂ oxidizes ferrocene to give a diamagnetic cation
 - The ligands in ferrocene undergo electrophilic substitution with RCOCl in the presence of a Lewis acid
 - The Fe centre in ferrocene can be protonated by treatment with concentrated H₂SO₄
 - In the gas phase, the C₅H₅ rings in ferrocene are eclipsed
16. The ores obtained from mines are usually in the form of ... *
- Power
 - Lump
 - Semi-solid
 - all of these
17. are used when gangue contains acidic silica as impurities. *
- Acidic Fluxes
 - Basic Fluxes
 - Neutral Fluxes
 - Both a and b
18. process is employed when impurities are less fusible than metal itself. *
- Liquation
 - Distillation
 - Oxidation
 - reduction
19. In dewar's charcoal method for separation of noble gas diffuses into charcoal and recovered by heating charcoal. *
- Helium
 - Argon
 - Neon
 - Xenon
20. The xenon fluorides XeF₂, XeF₄ and XeF₆: *
- are all gases at 298 K
 - are all thermodynamically unstable with respect to Xe and F₂
 - all react with water, but not at the same rate
 - all react with SiO₂ at 298 K
21. Which statement is correct? *
- Solid state KrF₂ and XeF₂ are isomorphous
 - XeO₃ is highly explosive
 - [XeF₅]⁻ is isoelectronic with IF₅
 - At pH 0, H₄XeO₆ is a powerful oxidizing agent, but is less powerful than [MnO₄]⁻

22. Which classification is correct? *
- XeF₂ is a fluoride donor
 - XeF₆ is a fluoride acceptor and but not a fluoride donor
 - AsF₅ donates fluoride ions to XeF_n
 - SbF₅ is a fluoride acceptor and always forms [SbF₆]⁻
23. Which structures for XeO₃ and XeF₄ are consistent with the VSEPR model? *
- XeO₃, trigonal pyramidal; XeF₄, square planar
 - XeO₃, trigonal planar; XeF₄, square planar
 - XeO₃, trigonal pyramidal; XeF₄, tetrahedral
 - XeO₃, trigonal planar; XeF₄, tetrahedral
24. Which statement is incorrect about XeF₂, XeF₄ and XeF₆? *
- All three compounds react with silica glass at 298 K.
 - All three compounds can be sublimed under vacuum.
 - All three compounds are oxidizing agents.
 - All three compounds react with H₂O.
25. The oxidation state of Xe in [HXeO₄]⁻ is: *
- +5
 - +8
 - +4
 - +6
26. In which compound of Xenon the oxidation state of Xenon is + 6? *
- XeF₄
 - XeOF₄
 - XeOF₂
 - Na₄XeO₆
27. Noble gases do not react with other element because.... *
- They have completely paired up and stable electron shells
 - The size of the atom are very small.
 - They are not found in abundance
 - are monoatomic
28. XeF₄ molecule has..... structure. *
- Tetrahedral
 - Square planar
 - Pentagonal
 - trigonal

29. Which of the following criteria is least important for a homogeneous, organometallic catalyst? *
- The metal centre must normally be able to accommodate both a 16 or 18 valence electron count
 - The metal centre must be able to tolerate more than one ligand geometry
 - The metal centre must be able to undergo oxidation and reduction reactions
 - The catalyst must contain a third row d-block metal
30. What is the formula for Wilkinson's catalyst? *
- $\text{RhCl}(\text{PPh}_3)_3$
 - RhClPPh_3
 - $\text{CH}_3\text{CH}_2\text{RhCl}$
 - $\text{CH}_3\text{CH}_2\text{RhClPPh}_3$
31. Which statement is wrong for Rhodium- PPh_3 hydrogenation catalysts? *
- Terminal alkynes are hydrogenated more rapidly than terminal alkenes
 - Conjugated dienes are reduced more slowly than isolated alkenes
 - Internal and branched alkenes undergo hydrogenation more rapidly than terminal ones
 - Polar functional groups containing alkenes are hydrogenated more rapidly than unsubstituted alkenes
32. What is the change in oxidation state of the metal when magnesium reacts with an alkyl bromide to give an alkylmagnesium bromide (Grignard reagent)? *
- $0 \rightarrow +1$
 - $0 \rightarrow +2$
 - $0 \rightarrow -1$
 - $0 \rightarrow -2$
33. What term describes the process whereby an alkyl halide undergoes reaction with magnesium metal to give an alkylmagnesium bromide (Grignard reagent)? *
- nucleophilic substitution
 - electrophilic addition
 - oxidative addition
 - reductive elimination
34. Which of the following bonds has the most ionic character?
- C-Sn
 - C-Cu
 - C-Zn
 - C-Li
35. Which of the following compounds is the strongest base? *
- $\text{CH}_3\text{CH}_2\text{MgBr}$
 - $\text{CH}_3\text{CH}_2\text{OH}$
 - $\text{CH}_3\text{CH}_2\text{OMgBr}$
 - CH_3CH_3

36. Which compound is most likely to undergo oxidative addition of H_2 ? *
- $RhCl(PPh_3)_3$
 - $Fe(CO)_5$
 - $[RhI_4(CO)_2]^-$
 - $[HFe(CO)_4]^-$
37. Which of the following compounds is the strongest base? *
- NaOH
 - NH_3
 - CH_3Li
 - CH_3OH
38. The electronic spectra in the visible range span is _____ *
- 25000-72000 cm^{-1}
 - 25000-50000 cm^{-1}
 - 12500-25000 cm^{-1}
 - 15000-30000 cm^{-1}
39. Which of the following transitions are of weak intensities and lie in the visible region? *
- $n \rightarrow n^*$
 - $\sigma \rightarrow \sigma^*$
 - $\pi \rightarrow \pi^*$
 - $n \rightarrow \sigma^*$
40. Arrange the various electronic transitions in the order of increasing energy. *
- $n \rightarrow \sigma^* < \pi \rightarrow \pi^* < n \rightarrow \pi^* < \sigma \rightarrow \sigma^*$
 - $n \rightarrow \pi^* < \pi \rightarrow \pi^* < n \rightarrow \sigma^* < \sigma \rightarrow \sigma^*$
 - $n \rightarrow \sigma^* < n \rightarrow \pi^* < \pi \rightarrow \pi^* < \sigma \rightarrow \sigma^*$
 - $\sigma \rightarrow \sigma^* < \pi \rightarrow \pi^* < n \rightarrow \pi^* < n \rightarrow \sigma^*$
- 7
41. The analysis of electromagnetic radiation scattered, absorbed or emitted by the molecule is called _____ *
- Kaleidoscopy
 - Astronomy
 - Spectroscopy
 - Anatomy
42. The energy level with lower energy is called _____ *
- Ground state energy level
 - Initial state energy level
 - Excited state energy level
 - All of the mentioned

43. Absorption spectrum results when an electron in an atom undergoes a transition from _____ *

- a) Higher energy level to a lower one
- b) Lower energy level to a higher one
- c) Intermediate levels
- d) All of the mentioned

44. The energy of a photon is given by _____ *

- a) h/ν
- b) ν/h
- c) $1/h\nu$
- d) $h\nu$

45. Select the incorrect statement from the following option. *

- a) Emission spectrum results when an electron in an atom undergoes a transition from excited state to the ground state
- b) In the emission spectrum, transition takes place with the emission of a photon of energy $h\nu$
- c) In the emission spectrum, transition takes place with the absorption of a photon of energy $h\nu$
- d) All of the mentioned

46. The spectra can be broadly classified into two categories. They are _____ *

- a) Atomic and molecular spectra
- b) Atomic and electronic spectra
- c) Molecular and electronic spectra
- d) None of the mentioned

47. The criteria for electronic spin resonance is _____ *

- a) Periodic change in polarisability
- b) Spin quantum number of nuclei > 0
- c) Presence of unpaired electron in a molecule
- d) Presence of chromophore in a molecule

48. What does the notation $\sigma^* \leftarrow n$ mean? *

- a. Absorption; transition from a quantum level n to σ^* MO.
- b. Absorption; transition from a non-bonding MO to σ^* MO.
- c. Emission; transition from a quantum level n to σ^* MO.
- d. Emission; transition from a non-bonding MO to σ^* MO.

49. The illustrated wave function represents the state of the linear harmonic oscillator with *

- a. $n = 1$ nodes
- b. $n = 5$ nodes
- c. $n = 4$ nodes
- d. $n = 3$ nodes

50. The lowest excited state of the helium atom has the term symbol *

- a. $2s^2$
- b. $1S_0$
- c. $3S_1$
- d. $2S_1$

51. KMnO_4 is coloured due to..... *

- a. d-d transition
- b. M-L transition
- c. L-M transition
- d. none of the above

52. CrO_3 is bright orange in colour due to.... *

- a. d-d transitions
- b. CT transition
- c. Both a and b
- d. none of the above

53. The atomic symbol for electron for which $L=2$ and $S=1$ is *

- a. $2D_{3,2,1}$
- b. $3D_{3,2,1}$
- c. $3D_{0,1,2}$
- d. $3D_{3/2,1/2,1}$

54. The number of microstate for d^3 configuration is *

- a. 60
- b. 120
- c. 240
- d. 45

55. A transition is said to be spin forbidden if it involves..... *

- a. same number of electron
- b. same number of unpaired electron
- c. different number of electron
- d. different number of unpaired electron

56. Chelate is a compounds. *

- a. Ring
- b. Straight chain
- c. both a and b
- d. none of these

57. Factor affecting the stability of complex are *

- a. Nature of metal ion and co-ordinating ligand
- b. Only metal ion
- c. Only temp
- d. None of these

58. Stability describe the of complex. *
- thermodynamic behaviour
 - Kinetic behaviour
 - Both a and b
 - None of these
59. On the basis of Nephelauxetic Effect ,Iodo complexes are more ionic than fluoro complexes .
- True
 - False
 - Cant Say
 - none of these
60. Along a Transition metal series, with the increase in nuclear charge, ionic radii of Divalent metal ions are expected to _____. *
- Steadily increase
 - Steadily decrease
 - Remain Constant
 - both a and b
61. The order of increasing energy of d orbital in square planar complex is . *
- $dxz = dyz < dz^2 < dxy < dx^2-y^2$
 - $dxz = dz^2 < dy^2 < dx^2-y^2 < dxy$
 - $dyz = dxy < dx^2-y^2 < dz^2$
 - $dyz = dxy < dz^2 < dx^2-y^2$
62. For a weak field d^5 configuration, the fifth electron occupies _____orbital *
- eg
 - t_{2g}
 - dxz
 - dyz
63. Jahn Teller distortions are more observed in complexex with unsymmetrically occupied _____orbital *
- t_{2g}
 - eg
 - dxy
 - dzy
64. In a Tetrahedral field ,the ligands approaches _____ *
- Along the Z axis
 - Along the X axis
 - In between the three axis
 - Along the y axis

65. In a Tetrahedral Field the set of orbitals with higher energies are _____ *
- t₂
 - e
 - t_{2g}
 - 10d_q
66. 20 In the square planar Complex four ligands are on the _____ plane *
- UV
 - NMR
 - Visible
 - IR
67. The relationship between the charge on the metal ion and the octahedral splitting parameter is _____ *
- Directly Proportional
 - Inversely Proportional
 - Independent of each other
 - both a and b
68. The Hyperfine splitting is due to the interaction of _____ *
- paired electron Spin with nuclear spin of metal
 - paired electron Spin with nuclear spin of metal
 - Unpaired electron Spin with nuclear spin of ligand
 - all of these
68. In the hexachloro complex of Ir ,the unpaired electron is localized to an extent of _____ on the ligands *
- 100%
 - 50%
 - 70%
 - 30%
69. How many total number of orbitals are available for metal ligand bond *
- 15
 - 12
 - 10
 - 20
70. How many orbitals of metal are suitable for sigma bonding ? *
- 6
 - 15
 - 9
 - 12

71. Ligands like _____ have both filled and vacant pi orbitals *
- CO
 - CN⁻
 - Mg
 - a and b
72. Hexacyano Ferrate (II) ion is _____ *
- Dimagnetic
 - Spin free
 - Paramagnetic
 - Both of these
73. If hydrolysis reaction results in formation of ____ complex it is called as base hydrolysis *
- Cyano
 - Hydroxo complex
 - aquo
 - all of these
74. In Thermodynamic terms, Complexes are referred as _____ *
- Labile
 - inert
 - stable
 - unstable
75. Stability of the ring structured Complex is known as _____ effect *
- Steric
 - Long pair
 - Chelate
 - Inert Pair
76. Complexes with forced configurations are _____ *
- more stable
 - strongly ionic
 - less stable
 - all of these
77. Substitution Nucleophilic results in the replacement of _____ *
- Central metal
 - only metal
 - ligands
 - all of these
78. The reactions which involves structural changes are called _____ reactions *
- Substitution
 - Oxidation
 - Redox
 - Isomerization and Racemization

79. Inner orbital complexes with vacant inner d orbitals are _____ *
- Inert
 - Ionic
 - Labile
 - Stable
80. The molar extinction co-efficient value for charge - transfer transition is of order _____ *
- $(10)^3$ to $(10)^6$
 - $(10)^4$ to $(10)^3$
 - $(10)^2$ to $(10)^4$
 - $(10)^2$ to $(10)^6$
81. The number of microstates for p^3 configuration is _____ *
- 45
 - 15
 - 50
 - 20
82. Higher the value of stability constant, _____ is the complex *
- Unstable
 - Less stable
 - more stable
 - none of these
83. Stable complex is formed by metal ion with _____ *
- less charge to radius ratio
 - Moderate charge to radius ratio
 - high charge to radius ratio
 - less charge
84. When log K values are plotted against aquo complexes of divalent metal ions _____ curve is obtained *
- Single peak
 - Weak peak
 - Double Humped
 - linear
85. Stability of complexes increases with _____ bonding capacity of the ligands *
- Sigma
 - gamma
 - pi
 - delta

86. The rate determining step is dissociation for _____ mechanism *
- SN1
 - SN1CB
 - SN2CB
 - Both a and b
87. Low spin octahedral complex with d5 configuration will contain ----- electrons in t2g orbitals.
- 2
 - 3
 - 4
 - 5
88. t2g orbitals from metal, form ----- molecular orbitals.
- Bonding
 - Antibonding
 - Nonbonding
 - None of these
89. Stability describes the ----- of complex.
- Thermodynamic behavior
 - Kinetic behavior
 - Both a and b
 - None of these
- Unit 3
90. The number of microstates for d3 configuration is
- 60
 - 120
 - 240
 - 45
91. The number of microstates for p2 configuration is
- 60
 - 120
 - 240
 - 15
92. In the equation, $4M + 8CN^- + H_2O + O_2 \rightarrow [M(CN)_2]^- + 4OH^-$, the metal M is *
- copper
 - iron
 - gold
 - Zinc
93. Heating ore with carbon in the absence of air is known as: *
- reduction
 - carbon-reduction
 - smelting
 - Roasting

94. Ferrocene cannot undergo which of the following reaction? *
- a) Friedal craft acylation
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 - c) Oxidation by Ag + ions
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95. Which of the following statement is not true about ferrocene? *
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96. The ores obtained from mines are usually in the from of ... *
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97. are used when gangue contains acidic silica as impurities. *
- a. Acidic Fluxes
 - b. Basic Fluxes
 - c. Neutral Fluxes
 - d. Both a and b
98. The atoms nobel gases except helium have stable electron configuration in valence shell. *
- a. s²p²
 - b. s²
 - c. s²p²
 - d. sp
99. The atomic radii of gases are..... *
- a. very small
 - b. very largr
 - c. same
 - d. both a and b
100. Transition element present in haemoglobin is..... *
- a. Fe
 - b. Cu
 - c. Mg
 - d. Zn