

CO-ORDINATION COMPOUNDS AND CHEMICAL BONDING

QUESTIONS

- IUPAC name of $[\text{Pt}(\text{NH}_3)_3\text{Br}(\text{NO}_2)\text{Cl}]\text{Cl}$ is
 - triamine chloro bromo nitro platinum (IV) Chloride
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 - triamine bromo chloro nitro platinum (III) Chloride
- Which of the following acts as a positive ligand?
 - Acetate
 - Carbonyl
 - Nitro
 - Nitrosonium
- EDTA is a
 - Monodentate ligand
 - Bidentate ligand
 - Tridentate ligand
 - Hexadentate ligand
- Which of the following cannot act as a ligand?
 - PH_3
 - NO^+
 - BF_3
 - Br^-
- Which exhibits highest molar conductivity?
 - $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$
 - $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
 - $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$
 - $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
- The fraction of chlorine precipitated by AgNO_3 Solution from $[\text{Cr}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ is
 - $\frac{1}{2}$
 - $\frac{2}{3}$
 - $\frac{1}{3}$
 - $\frac{1}{4}$
- One mole of a complex compound $\text{Co}(\text{NH}_3)_5\text{Cl}_3$ give 3 moles of ions on dissolution in water. One mole of the same complex reacts with two moles of AgNO_3 solution to yield two moles $\text{AgCl}(\text{s})$ the complex is
 - $[\text{Co}(\text{NH}_3)_3\text{Cl}_3].2\text{NH}_3$
 - $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}.\text{NH}_3$
 - $[\text{Co}(\text{NH}_3)_4\text{Cl}]\text{Cl}_2.\text{NH}_3$
 - $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$
- The compounds $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$, $[\text{Cr}(\text{H}_2\text{O})_5\text{Cl}]\text{Cl}_2.H_2\text{O}$ and $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl}_2.H_2\text{O}$ represent
 - linkage isomers
 - ionization isomers
 - hydrate isomers
 - coordination isomers
- $[\text{Ni}(\text{CN})_4]^{-2}$ and $[\text{NiCl}_4]^{-2}$ have similarity but not in
 - magnetic moment
 - coordination number and oxidation number
 - Structure
 - a and c
- Which statement is incorrect?
 - $\text{Ni}(\text{CO})_4$ - tetrahedral paramagnetic
 - $[\text{Ni}(\text{CN})_4]^{-2}$ - square planar and diamagnetic
 - $[\text{Cu}(\text{CN})_4]^{-2}$ - square planar paramagnetic
 - $[\text{NiCl}_4]^{-2}$ - tetra hedral paramagnetic

11. Which one of the following complexes is outer orbital complex?
 a) $[Co(NH_3)_6]^{+3}$ b) $[Mn(CN)_6]^{-4}$ c) $[Fe(CN)_6]^{-4}$ d) $[Ni(NH_3)_6]^{+2}$
12. The complex ions $[Co(NH_3)_5(NO_2)]^{2+}$ and $[Co(NH_3)_5(ONO)]^{2+}$ are called
 a) Ionization isomers b) Linkages isomers
 c) Co-ordination isomers d) Geometrical isomers
13. The complex that violates EAN rule is;
 a) Potassium Ferro cyanide b) Potassium ferricyanide
 c) Tetracarbonyl nickel d) Hexamine cobalt (III) chloride
14. Which one of the following ligands forms a chelate ring?
 a) Acetate b) Oxalate c) Cyanide d) Ammonia
15. Co-ordination compounds have great importance in biological systems. In this context which of the following statements is incorrect?
 a. Cyano cobalamine is Vitamin B₁₂ and contains cobalt
 b. Haemoglobin is the red pigment of blood and contains iron
 c. Chlorophyll is the green pigment of plants and contains calcium.
 d. Carboxy peptidase- A is an enzyme and contains Zinc.
16. Which compound is zero valent metal complex?
 a) $[Cu(NH_3)_4]SO_4$ b) $[Pt(NH_3)_2Cl_2]$ c) $[Ni(CO)_4]$ d) $K_3[Fe(CN)_6]$
17. The Shape of Cuprammonium ion is
 a) trigonal b) tetrahedral c) octahedral d) square planar
18. The two complexes $PtCl_4 \cdot 2NH_3$ and $PtCl_4 \cdot 2KCl$ do not give precipitate of $AgCl$ when treated with $AgNO_3$. The conductance studies indicate zero and three ions per mole of the complex respectively in their solution. The structure of these complexes is
 a) $[Pt(NH_3)_2Cl_4]$ and $K_2[PtCl_6]$ b) $[Pt(NH_3)_2Cl_2]$ and $K_2[PtCl_6]$
 c) $[Pt(NH_3)_2Cl_2]Cl_2$ and $K_2[PtCl_4]Cl_2$ d) $[Pt(NH_3)_2Cl_4]$ and $[K_2PtCl_6]$
19. $Fe(CN)_6^{-3}$ ion has magnetic moment of 1.73 BM while $Fe(H_2O)_6^{+3}$ has a magnetic moment of 5.92 BM. Thus, hybridization of Fe in both the complexes is respectively;
 a) d^2sp^3, sp^3d^2 b) sp^3d^2, d^2sp^3 c) d^2sp^3, d^2sp^3 d) sp^3d^2, sp^3d^2
20. Ammonia forms the complex ion $[Cu(NH_3)_4]^{2+}$ with copper ions in alkaline solution but not in acidic solution. What is the reason for it?
 a. In acidic solution, protons coordinate with ammonia molecules forming NH_4^+ ions and NH_3 molecules are not available
 b. In alkaline solution insoluble $Cu(OH)_2$ is precipitated which is soluble in excess of any alkali.
 c. Copper hydroxide is an amphoteric substance
 d. In acidic solutions, hydration protects copper ions.

31. What is wrong w.r.t ABMO ?

- a. It is formed by subtraction of wave function of two atomic orbitals
- b. Lobes of combining orbitals have same sign
- c. It has higher energy than combining atomic orbitals
- d. It causes destabilization of the species.

32. Which of the following represent the bond order?

- a) $2[N_B - N_A]$ b) $\frac{1}{2}[N_B - N_A]$ c) $\frac{1}{2}[N_B + N_A]$ d) $\frac{1}{2}\left[\frac{N_B}{N_A}\right]$

33. During the formation of O_2^+ from O_2 the electron goes from:

- a) σ_{2p_z} b) π_{2p_x} c) $\pi^*_{2p_y}$ d) None of these

34. Which is not matched correctly for bond order?

- a) N_2 , 3 b) O_2 , 2 c) He_2 , 1 d) C_2 , 2

35. Which of the following is correct w. r. t. bond dissociation energies of O_2 and O_2^+ , E_1 and E_2 respectively?

- a) $E_1 > E_2$ b) $E_1 = E_2$ c) $E_1 < E_2$ d) Cannot be decided

36. Pair of which choices has the same bond order?

- a) N_2 and O_2^{2+} b) N_2 and O_2^{2-} c) N_2^{2+} and O_2^{2+} d) N_2^{2-} and O_2^{2-}

37. Which of the following has shortest bond length?

- a) O_2^{2+} b) O_2^+ c) O_2 d) O_2^{2-}

38. Which of following species exhibits the diamagnetic behavior?

- a) NO b) O_2^{-2} c) O_2^+ d) O_2

39. Which of the following orbital in oxygen molecule has the least energy ?

- a) σ_{2p_z} b) π_{2p_x} c) $\pi^*_{2p_x}$ d) $\sigma^*_{2p_z}$

40. Which of the following species is not diamagnetic?

- a) C_2 b) O_2^{-2} c) Li_2 d) N_2^+

41. N_2^+ Has 13 electrons. A species with an add no. of electron is diamagnetic. The number of antibonding electron pairs in the O_2^{2-} molecular ion on the basis of M. O. theory is

- a) 2 b) 3 c) 4 d) 1

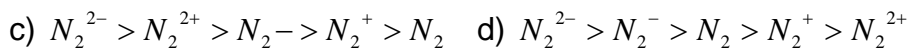
42. According to the M. O. T which of the following statements about is correct regarding O_2^+ ?

- a) Paramagnetic and B. O < O_2
- b) Paramagnetic and B. O > O_2
- c) Diamagnetic and B. O > O_2
- d) diamagnetic and B. O. > O_2

43. Bond order value of P – O bond PO_4^{3-} ion is expected to be:

- a) 1 b) 2 c) 1.5 d) 1.25

44. The decreasing order of bond length for N_2 and its ions is correctly show in :



45. Which of the following statements is wrong ?

- a. Linear overlapping of atomic orbitals gives sigma molecular orbitals
- b. Sidewise overlapping of atomic orbitals gives pi molecular orbitals
- c. x- axis is arbitrarily chosen as internuclear axis
- d. For O_2 , F_2 and Ne_2 , the energy of σ_{2p_z} is lesser than energies of π_{2p_x} and π_{2p_y}

46. The number of nodal planes present in S^*S antibonding orbital is

- a) 0 b) 3 c) 1 d) 2

47. Malleability and ductility of metals are because of:

- a. Sliding of kernels of one layer on another
- b. Sliding of mobile electrons of the electron cloud
- c. Strong electrostatic force of attraction between kernels and mobile electrons
- d. all of the above

48. High tensile strength of metals is because of:

- a. Sliding of kernels of one layer on another
- b. Sliding of mobile electrons of the cloud
- c. Strong electrostatic force of attraction between kernels and mobile electrons
- d. All of the above

49. Among KO_2 , AlO_2^- , BaO_2 and NO_2^+ unpaired electrons are present in

- a) NO_2^+ and BaO_2 b) KO_2 and AlO_2^-
c) KO_2 only d) BaO_2 only

50. KO_2 is potassium super oxide. Super oxide ion O_2^{2-} has one unpaired electron. An example of a metal that exhibits photoelectric effect

- a) Zn b) Al c) Ba d) Cs

51. The reason for the difference in the sequence of energy level for N_2 and O_2 is

- a. Nitrogen is polar while oxygen is non polar
- b. In nitrogen energy difference between σ_{2p_z} and σ_{2s} is larger than in oxygen
- c. In nitrogen σ_{2s} and σ_{2p_z} interact while in oxygen these do not interact
- d. In oxygen σ_{2s} and σ_{2p_z} interact

52. Plus and minus signs in the representation of orbital  represents the

- a) charge b) sign of wave function
c) probability area d) none