Coordination Compounds - III

2021-22

Name:

Mobile No:

Write your answer in the boxes provided.
Test Duration: **30mins**

1. Which one of the following ions exhibits d-d transition and paramagnetism as well?

(A) MnO_4^- (B) $Cr_2O_7^{2-}$ (C) CrO_4^{2-} (D) MnO_4^{2-}

2. Which of these statements about $\left[Co(CN)_6\right]^{3-}$ is true?

(A) $\left[Co(CN)_6\right]^{3-}$ has no unpaired electrons and will be in a low-spin configuration.

(B) $\left[Co(CN)_6\right]^{3-}$ has four unpaired electrons and will be in a low-spin configuration.

(C) $\left[Co(CN)_6\right]^{3-}$ has four unpaired electrons and will be in a high-spin configuration.

(D) $\left[Co(CN)_6\right]^{3-}$ has no unpaired electrons and will be in a high-spin configuration.

3. Crystal field stabilisation energy for high spin d^4 octahedral complex is:

(A) $-1.8\Delta_0$ (B) $-1.6\Delta_0 + p$ (C) $-1.2\Delta_0$ (D) $-0.6\Delta_0$

4. Among the following complexes the one which shows zero crystal field stabilisation energy (CFSE) is:

(A) $\left[Mn(H_2O)_6\right]^{3+}$ (B) $\left[Fe(H_2O)_6\right]^{3+}$

(C) $\left[Co(H_2O)_6\right]^{2+}$ (D) $\left[Co(H_2O)_6\right]^{3+}$

5. $\left[Ni(CN)_4\right]^{2-}$ and $\left[Ni(CO)_4\right]$ have _____.

(A) sp^3 hybridised Ni in both cases (B) sp^3 and sp^2d- hybridised Ni

(C) dsp^2 and sp^3 hybridised Ni (D) dsp^2 in both cases

6. Which one of the following cyano complexes would exhibit the lowest value of paramagnetic behaviour?

(A) $\left[Cr(CN)_6\right]^{3-}$ (B) $\left[Mn(CN)_6\right]^{3-}$

(C) $\left[Fe(CN)_6\right]^{3-}$ (D) $\left[Co(CN)_6\right]^{3-}$

(Atomic numbers: Cr = 24, Mn=25, Fe = 26, Co = 27)

7. Among the following species the one which causes the highest CFSE, Δ_0 as a ligand is:

(A) CN^- (B) NH_3 (C) F^- (D) CO

8. In $Fe(CO)_5$, the $Fe-C$ bond possesses _____.

(A) $\pi-$ character only (B) both σ and π characters
(C) ionic character (D) $\sigma-$ character only

9. Which of the following complex are tetrahedral in shape.

(A) $\left[Fe(CN)_6\right]^{4-}$ (B) $\left[Fe(CO)_5\right]$

(C) $\left[Cu(CN)_4\right]^{3-}$ (D) $\left[AuCl_4\right]^-$

10. Which one of the following complexes in an outer orbital complex?

(A) $\left[Fe(CN)_6\right]^{4-}$ (B) $\left[Ni(NH_3)_6\right]^{2+}$

(C) $\left[Co(NH_3)_6\right]^{3+}$ (D) $\left[Mn(CN)_6\right]^{4-}$

11. For the complex ML_2, stepwise formation constants for $M + L \rightleftharpoons ML$ and $ML + L \rightleftharpoons ML_2$ are 4 and 3 respectively. Hence, overall stability constant for $M + 2L \rightleftharpoons ML_2$ is:

(A) 12 (B) 7 (C) 1.33 (D) 0.75

12. Select the incorrect statement.

(A) $\left[Ni(en)_3\right]^{2+}$ is less stable than $\left[Ni(NH_3)_6\right]^{2+}$.

(B) Increase in stability of the complexes due to presence of multidentate cyclic ligand is called macrocyclic effect.

(C) A complex ion that exchanges ligands slowly is said to be non-labile or inert.

(D) For a given ion and ligand, greater the charge on the metal ion, greater the stability.