

2021-22

01-03-2022

Name:

Write your answer in the boxes provided.

Mobile No:

Test Duration: 30mins

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

(A) MnO_4^- (B) $\text{Cr}_2\text{O}_7^{2-}$ (C) CrO_4^{2-} (D) MnO_4^{2-}

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

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

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

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

(D) $[\text{Co}(\text{CN})_6]^{3-}$ 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) $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$

(C) $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ (D) $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$

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

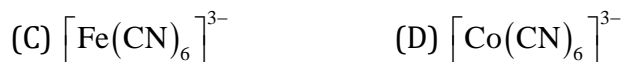
(A) sp^3 hybridised Ni in both cases

(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?



(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:



8. In $\text{Fe}(\text{CO})_5$, the Fe – C bond possesses _____.



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



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



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