

End Semester Examinations - 2015-16 Even Semester - May 2016

15CH3005 Coordination Chemistry

Set A

Time : 3 hrs
Total Marks: 100

1. (a) Write two examples of polydentate ligands. (1)
(b) Explain the valence bond theory for square planar complexes. (3)
(c) What are the merits and defects of crystal field theory? (6)
(d) Calculate CFSE in octahedral and tetrahedral geometry for the following ions. (10)
 d^1, d^3, d^5, d^7 and d^9

OR

2. (a) Write the names for the following complexes. (1)
(i) $K_4[Fe(CN)_6]$ (ii) $[Co(NH_3)_6]^{3+}$
(b) What are the defects of Werner's theory. (3)
(c) Write a note on spectrochemical series and its application. (6)
(d) Discuss the application of CFSE in site selection in spinel and anti-spinel structures. (10)
3. (a) $[Co(NH_3)_5NO_3]SO_4$ and $[Co(NH_3)_5SO_4]NO_3$ are examples for (1)
(i) Linkage isomerism (ii) Solvate isomerism
(iii) Ionization isomerism (iv) Coordination isomerism
(b) Write the Irving-William Series. (3)
(c) Derive the relationship between stepwise and overall stability constant. (6)
(d) Draw the MO diagram for an octahedral complex having only σ interaction and explain. (10)

OR

4. (a) Write any two examples of π acceptor ligands. (1)
(b) Explain linkage isomerism with example. (3)
(c) Write a note on thermodynamic and kinetic stability. (6)
(d) Describe the chelate effect and macrocyclic effect with examples. (10)
5. (a) The complex $[Mn(H_2O)_6]^{2+}$ has very light pink color. The best reason for it is (1)
(i) The complex does not have a charge-transfer transition
(ii) d-d transitions here are orbital forbidden but spin-allowed
(iii) d-d transitions here are orbital allowed but spin forbidden
(iv) d-d transitions here are both orbital forbidden and spin-forbidden
(b) Write the nephelauxetic series. (3)
(c) What are the various types of absorption spectra in metal complexes? Explain. (6)
(d) Draw the orgel diagrams for the following configurations in tetrahedral field. (10)
 d^1, d^2, d^3, d^6 and d^8

OR

6. (a) Write the term symbols for the following ions. (i) V^{3+} (ii) Cu^{2+} (1)
(b) Discuss the importance of Tanabe- Sugano diagram. (3)
(c) State the selection rules for electronic transitions in complexes and explain. (6)
(d) Write a detailed account on John teller distortion and its effect on electronic spectra. (10)

7. (a) Write the spin only magnetic moment values for the following ions. (1)
 (i) Cr^{3+} (ii) Mn^{3+}
 (b) Describe the anation reaction with examples. (3)
 (c) Discuss the orbital contribution to magnetic moment with examples. (6)
 (d) Explain the $\text{S}_{\text{N}}2$ mechanism for the substitution reaction in octahedral complexes. (10)

OR

8. (a) The suitable magnetic moment formula applicable for lanthanides is
 (i) μ_{S} (ii) $\mu_{\text{S}+\text{L}}$ (iii) μ_{J} (iv) all the three (1)
 (b) Compare the properties of paramagnetic and diamagnetic complexes. (3)
 (c) Explain the applications of trans effect. (6)
 (d) Discuss the $\text{S}_{\text{N}}1\text{CB}$ mechanism for the substitution in octahedral complexes. (10)
9. (a) The electronic configuration for gadolinium (Gd) is $[\text{Xe}]4\text{f}^75\text{d}^16\text{s}^2$, where as that of Gd^{2+} is
 (i) $[\text{Xe}]4\text{f}^55\text{d}^16\text{s}^2$ (ii) $[\text{Xe}]4\text{f}^66\text{s}^2$ (iii) $[\text{Xe}]4\text{f}^65\text{d}^16\text{s}^1$ (iv) $[\text{Xe}]4\text{f}^75\text{d}^1$ (1)
 (b) Write a short note on synthesis of transactinide elements. (3)
 (c) What are complementary and non-complementary electron transfer reactions? Explain with an example. (6)
 (d) Write a detailed account on mechanism of inner sphere electron transfer reaction. (10)

Wishing you All the Best
