

Unit 8 - Week 6

Assignment 6

The due date for submitting this assignment has passed.
 As per our records you have not submitted this assignment.

Due on 2019-09-11, 23:59 IST.

1) In square planar coordination environment, the energy ordering of the five d-orbital is 1 point

- A. $d_{x^2-y^2} > d_z^2 > d_{xy} > d_{xz}, d_{yz}$
- B. $d_z^2 > d_{xy}, d_{x^2-y^2} > d_{xz}, d_{yz}$
- C. $d_z^2 > d_{x^2-y^2} > d_{xz} > d_{xy}, d_{yz}$
- D. $d_{x^2-y^2} > d_{xy} > d_z^2 > d_{xz}, d_{yz}$

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 D

2) The correct placement of the ligands in their order in the spectrochemical series is 1 point

- A. $Br^- < Cl^- < H_2O < NH_3$
- B. $Br^- > Cl^- > NH_3 > H_2O$
- C. $Br^- < NH_3 < Cl^- < H_2O$
- D. $NH_3 < H_2O < Br^- < Cl^-$

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 A

3) Amongst the following four complex ions, the only correct combination of complex ion and its color is 1 point

Complex	Color
(i) $[Co(CN)_4]^{2-}$	(a) red
(ii) $[CoCl_4]^{2-}$	(b) orange
(iii) $[Co(NCS)_4]^{2-}$	(c) blue
(iv) $[CoF_4]^{2-}$	(d) yellow

- A. iv-d
- B. iii-c
- C. ii-b
- D. i-a

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 B

4) The light pink color of $[Co(H_2O)_6]^{2+}$ and the deep blue color of $[CoCl_4]^{2-}$ are due to 1 point

- A. MLCT transition in the first and d-d transition in the second
- B. d-d transition in the first and MLCT transition in the second
- C. d-d transitions in both
- D. LMCT transitions in the both

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 C

5) The magnetic moment of octahedral Co(II) complex is $4.0 \mu_B$. the electronic configuration of the complex is 1 point

- A. $t_{2g}^3 e_g^4$
- B. $t_{2g}^6 e_g^1$
- C. $t_{2g}^4 e_g^3$
- D. $t_{2g}^5 e_g^2$

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 D

6) The correct order for Δ_o for the below given complexes is 1 point

- I. $[Co(H_2O)_6]^{2+}$ II. $[Co(H_2O)_6]^{3+}$ III. $[Fe(H_2O)_6]^{3+}$ IV. $[Fe(CN)_6]^{3-}$
- A. II < III < I < IV
- B. I < III < II < IV
- C. I < IV < II < III
- D. IV < III < I < II

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 B

7) Among the following, the complex ion that would show strong Jahn-Teller distortion is 1 point

- A. $[Cr(H_2O)_6]^{2+}$
- B. $[Ti(H_2O)_6]^{3+}$
- C. $[Co(H_2O)_6]^{2+}$
- D. $[Mn(H_2O)_6]^{2+}$

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 A

8) The relative crystal field splitting Δ_{oct} and Δ_{tet} are related by the equation 1 point

$$\Delta_{tet} = X \cdot \Delta_{oct}$$

The magnitude of 'X' in the above expression is

- A. 9/4
- B. 5/9
- C. 4/9
- D. 9/5

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 C

9) The experimental magnetic moment of $K_3[Fe(CN)_6]$ is $2.3 \mu_B$ and is attributable to the 1 point

- A. spin-only value of low-spin Fe
- B. spin-only value of high-spin Fe
- C. low-spin Fe with orbital contribution
- D. high-spin Fe with orbital contribution

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 C

10) If a tetrahedral complex absorbs at 545 nm, what would be its respective octahedral crystal field splitting (Δ_o)? 1 point

- A. $2.75 \times 10^{-16} J$
- B. $4.50 \times 10^{-18} J$
- C. $1.97 \times 10^{-14} J$
- D. $8.30 \times 10^{-18} J$

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 D

11) The d-d absorption band of $[Fe(H_2O)_6]^{+2}$ is split due to 1 point

- A. presence of octahedral geometry
- B. static Jahn-Teller distortion
- C. dynamic Jahn-Teller distortion
- D. presence of trigonal bipyramidal geometry

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 C

12) Which of the following statements is incorrect? 1 point

- A. For a tetrahedral d^4 complex, 3 absorptions are expected in its electronic spectrum
- B. The electronic spectrum of $[Ni(NH_3)_6]^{2+}$ contains 3 absorptions
- C. Absorptions in the electronic spectrum of $[Mn(OH_2)_6]^{2+}$ are extremely weak
- D. The absorption in the electronic spectrum of $[Ti(OH_2)_6]^{3+}$ is assigned to the $E_g \leftarrow T_{2g}$ transition

- A
- B
- C
- D

No, the answer is incorrect.
 Score: 0

Accepted Answers:
 A

Course outline

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Lecture 18: Bonding in Complexes - IV

Lecture 19: Jahn - Teller Effect

Lecture 20: Spin Crossover and Colour

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Assignment Solution