

Code No. : 20009 E Sub. Code : SMCH 61

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Sixth Semester

Chemistry — Core

INORGANIC CHEMISTRY — III

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. An example of polydentate ligand is

- (a) Ammonia
(b) Carbon monoxide
(c) EDTA
(d) en

6. Which ion is kinetically inert?

- (a) Cr^{2+} (b) Co^{3+}
(c) Fe^{3+} (d) Co^{2+}

7. Which of the following is not considered as an organometallic compound?

- (a) Grignard reagent
(b) Ziese's salt
(c) Cis-platin
(d) Ferrocene

8. What is the formula for Wilkinson's catalyst?

- (a) $\text{RhCl}(\text{PPh}_3)_3$ (b) RhClPPh_3
(c) $\text{CH}_3\text{CH}_2\text{RhCl}$ (d) $\text{CH}_3\text{CH}_2\text{RhClPPh}_3$

9. The first step in any photo physical process must be the absorption of the _____ light.

- (a) UV (b) Incident
(c) Transmitter (d) Sun

10. If the labialised axis contains two different ligands, then the ligand with the _____ field strength will preferentially aquate.

- (a) Smaller (b) Minimum
(c) Greater (d) None of these

Page 3 Code No. : 20009 E

2. According to VBT, the formation of stable bond requires

- (a) The electron should have opposite spins
(b) The greater overlapping of the electron clouds
(c) The two atoms should be close to each other
(d) All of the above

3. The ligand which is having highest splitting ability is

- (a) CN^- (b) NH_3
(c) H_2O (d) Cl^-

4. In CFT, when the valence d-orbitals of the central metal ion are split in energy in an octahedral ligand field, which orbitals are having least in energy?

- (a) d_{xy} and $d_{x^2-y^2}$ (b) d_{xy} , d_{xz} and d_{yz}
(c) d_{xz} and d_{yz} (d) d_{xz} , d_{yz} and d_{z^2}

5. The ordering of ligands in trans effect series is

- (a) $\text{CN}^- > \text{CH}_3^- > \text{NO}_2^- > \text{Cl}^-$
(b) $\text{CN}^- < \text{CH}_3^- < \text{NO}_2^- < \text{Cl}^-$
(c) $\text{CN}^- \text{CH}_3^- < \text{NO}_2^- > \text{Cl}^-$
(d) $\text{CN}^- < \text{CH}_3^- < \text{NO}_2^- > \text{Cl}^-$

Page 2 Code No. : 20009 E

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain the terms, monodentate, bidentate and polydentate ligands with suitable examples.

Or

(b) Discuss the structure of $\text{Ni}(\text{CO})_4$ based on VB theory.

12. (a) Give the postulates of CFT.

Or

(b) Define crystal field stabilization energy. What are the limitations of CFT?

13. (a) What is base hydrolysis? Explain with suitable mechanism.

Or

(b) With a suitable example, elucidate the mechanism of outer sphere electron transfer reaction.

14. (a) Describe the mechanism of hydroformylation of alkene using Co-based catalyst.

Or

(b) Explain the mechanism of hydrogenation of olefins using Wilkinson catalyst.

Page 4 Code No. : 20009 E

[P.T.O.]

15. (a) Give a brief discussion on photo redox reaction of Co(III) complex.

Or

- (b) Discuss the photo isomerisation in Pt(II) complex.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Write the limitations and merits of valence bond theory.

Or

- (b) Explain the geometrical isomerism in tetrahedral complexes with suitable example.

17. (a) How are stepwise and overall stability constants related? Write any one method to determine the stability constant.

Or

- (b) Explain with suitable examples of splitting of d-orbital in octahedral and tetrahedral complexes.

Page 5 Code No. : 20009 E

18. (a) Write a note on :

(i) anation reaction

(ii) aquation with suitable mechanisms.

Or

- (b) Briefly discuss the ligand substitution reaction in square planar complexes.

19. (a) Explain the structure and bonding in metal carbonyls.

Or

- (b) Outline the mechanism of olefin polymerization using Zeiger - Natta catalyst.

20. (a) (i) State and explain the Adamson's rules. (4)

(ii) Write a note on semiconductor based photovoltaic cell. (4)

Or

- (b) Discuss briefly the photosubstitution reaction of Cr(III) complexes with suitable examples.

Page 6 Code No. : 20009 E