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(FOR THE CANDIDATES ADMITTED

21PCY204

DURING THE ACADEMIC YEAR 2021 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : JULY 2022

M.Sc.-CHEMISTRY

MAXIMUM MARKS: 70

II SEMESTER

TIME : 3 HOURS

INORGANIC CHEMISTRY-II
CO-ORDINATION AND ORGANOMETALLIC CHEMISTRY

SECTION - A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

(K1)

1. What will be the coordination number and oxidation state of FeCl_2 in water?
a) 2, +2 b) 6, +2 c) 6, 0 d) 8, +2
2. The lowest energy term for the d^8 configuration is _____.
a) 3D b) 5S c) 3F d) 3P
3. The reaction of $[\text{PtCl}_4]^{2-}$ with two equivalents of NH_3 gives _____.
a) $\text{trans-Pt}(\text{NH}_3)_2\text{Cl}_2$ b) $\text{Pt}(\text{Cl}_4)^{2-}$
c) $\text{Pt}(\text{NH}_3)_4^{2-}$ d) $\text{cis-Pt}(\text{NH}_3)_2\text{Cl}_2$
4. Among the following, the correct statement is _____.
a) CH_2 is isolobal to $\text{Ni}(\text{CO})_2$ b) CH is isolobal to $\text{Co}(\text{CO})_3$
c) CH is isolobal to $\text{Fe}(\text{CO})_4$ d) CH_2 is isolobal to $\text{Mn}(\text{CO})_4$
5. Which of the following is Zeise's salt?
a) $[\text{Pt}(\text{C}_2\text{H}_4)\text{Cl}_3]^-$ b) $[\text{Pd}(\text{C}_2\text{H}_4)\text{Cl}_3]^-$
c) $[\text{Pt}(\text{C}_2\text{H}_4)_2\text{Cl}_2]^-$ d) $\text{cis-Pt}(\text{NH}_3)_2\text{Cl}_2$

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Define crystal field stabilization energy.
7. Give any one example for LMCT.
8. Illustrate any one inorganic reaction which follows outersphere mechanism.
9. Draw the structure of $\text{Fe}_2(\text{CO})_9$.
10. Illustrate any one preparation of metal alkyne complex.

SECTION – B

(5 X 4 = 20 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) Calculate CFSE for the following:

i) $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ ii) d^5 configuration (octahedral, low spin)

(OR)

- b) Describe chelate effect with examples.

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12. a) Calculate ground state term for the following configuration:

- i) d^2 ions ii) d^5 (high spin)

(OR)

b) Describe briefly Nephelauxetic effect and its consequences.

13. a) Examine the dissociative mechanism in substitution reaction of octahedral complexes.

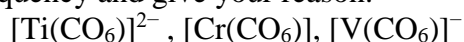
(OR)

b) Describe briefly the π -bonding theory of *trans*-effect.

14. a) Describe the structural elucidation of metal carbonyl halides.

(OR)

b) Arrange the following metal carbonyls in decreasing order of CO stretching vibrational frequency and give your reason.



15. a) Describe any two methods of preparation of metal allyl complexes.

(OR)

b) Examine the reaction of an alkene, alkyne and CO in presence of $\text{Co}_2(\text{CO})_8$.

SECTION - C

(4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS

(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS (FROM Qn. No : 17 to 21)

(K4 (Or) K5)

16. Outline the factors affecting the magnitude of Δ .

17. Summarize the important assumptions of CFT.

18. Draw and explain Orgel diagram for d^1 system in octahedral complex.

19. Discuss briefly the mechanism of nucleophilic substitution reaction in square planar complex.

20. i) Write a note on bonding in metal nitrosyl complex.

ii) Identify the following as closo/nido/arachno using Wade's rule.



21. Explain in detail synthesis, bonding and any two reactions of ferrocene.

