

Reg. No

Name

23P2005-S

MSc DEGREE END SEMESTER EXAMINATION - MARCH 2023
SEMESTER 2 : CHEMISTRY / PHARMACEUTICAL CHEMISTRY
COURSE : 16P2CHET05 / 16P2CPHT05 ; INORGANIC CHEMISTRY - II
(For Supplementary 2020/2019/2018/2017 Admissions)

Time : Three Hours

Max. Marks: 75

PART A

Answer any 10 (2 marks each)

1. What are the factors that affect the rate of water exchange reactions?
2. What is circular dichroism?
3. What is nephelauxetic effect?
4. What is Prussian blue and Turnbull's blue?
5. What is trans effect?
6. Differentiate between d-d transition and CT transition.
7. What is ORD?
8. What are the factors that mitigate the formation of complexes in lanthanides?
9. What is annation reaction? Give an example.
10. What is the advantage of using $\text{Eu}(\text{fod})_3$ in NMR spectroscopy?
11. Calculate the CFSE for both low spin and high spin d^7 configuration in terms of Δ and P.
12. For a total co-ordination number of eight, how many geometries are possible for complexes?
13. Discuss how the magnetic susceptibility of ferromagnetic materials vary with temperature
(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

14. Discuss the d orbital splitting in Tetragonal and square planar field.
15. Explain Temperature independent paramagnetism.
16. Among MnO_4^- , CrO_4^{2-} and VO_4^{3-} , what is the order of energy of transition? Explain.
17. Discuss Piper's methodology of assigning absolute configuration to an octahedral complex.
18. Explain Guoy Method for the determination of molar magnetic susceptibility
19. Differentiate between labile and inert complexes. Explain, why $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ is labile whereas $[\text{Cr}(\text{CN})_3]^{3-}$ is inert?
20. Explain conjugate base mechanism of base hydrolysis. What are the advantages of this mechanism?
21. Explain Symbiosis with suitable examples.
(5 x 5 = 25)

PART C

Answer any 2 (15 marks each)

22. Discuss briefly the mechanism of outer – sphere and inner sphere electron transfer reactions. How can Marcus theory be used to explain outer sphere electron transfer reactions?

23. a) What are Orgel diagrams? Draw the Orgel diagrams for d^1 , d^2 , d^3 and d^9 systems in both octahedral and tetrahedral fields. (10 Mark)
b) What is Tanabe sugano diagram? How it is superior to Orgel diagram? (5 Mark)
24. Discuss the magnetic properties of lanthanides, actinides and transition elements.
25. a) Explain Jahn- Teller distortion with suitable example. How it affects the electronic transition of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$?
b) Discuss the MO treatment for tetrahedral complexes with sigma bonding alone and draw the molecularorbital energy level diagram. Show the ligand field splitting parameter Δ_t .

(15 x 2 = 30)