

Reg. No

Name

19P2005

MSc DEGREE END SEMESTER EXAMINATION - MARCH/APRIL 2019
SEMESTER 2 : CHEMISTRY / PHARMACEUTICAL CHEMISTRY
COURSE : 16P2CHET05 / 16P2CPHT05 : INORGANIC CHEMISTRY - II
(For Regular - 2018 Admission and Supplementary - 2017/2016 Admissions)

Time : Three Hours

Max. Marks: 75

Section A

Answer any 10 (2 marks each)

1. $[\text{RuCl}_6]^{2-}$ is low spin complex, though Cl^- is lower in the spectrochemical series. Why?
2. Most of the Pd (II) and Pt (II) complexes are low spin complexes. Explain Why?
3. Arrange the halides F, Cl, Br and I in the increasing order in which they form stable complexes with more electropositive metals. Give reason.
4. For the following free ion terms determine the values of L, M_L , S and M_S Values. 2D and 3G .
5. Though d-d transitions are forbidden transitions, very low intensity transition is observed in metal complexes. Why?
6. What are the information that can be obtained if there is a variation in the spin only magnetic moment and the actual magnetic moment of a complex?
7. $[\text{Ni}(\text{CN})_4]^{2-}$ is thermodynamically stable but kinetically labile. What do you mean by this?
8. Arrange the following in order of increasing rate of water exchange. Give explanation for your answer. $[\text{V}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$, $[\text{Mg}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Al}(\text{H}_2\text{O})_6]^{3+}$
9. Is the reaction $[\text{Co}(\text{NH}_3)_6]^{3+} + [\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ likely to proceed by an inner-sphere or outer-sphere mechanism? Explain your answer.
10. Explain linkage isomerism with an example.
11. Explain fac and mer isomerism with a suitable example.
12. What is Prussian blue chemically? Give reason for its intense colour.
13. Work out the number of unpaired electrons in Ce^{4+} , Yb^{2+} , Gd^{3+} and Tb^{4+} .

(2 x 10 = 20)

Section B

Answer any 5 (5 marks each)

14. Discuss the thermodynamic aspects of complex formation.
15. How the stability constant of a complex is determined experimentally?
16. Discuss how antiferromagnetism is observed in metal oxides.
17. Among MnO_4^- , CrO_4^{2-} and VO_4^{3-} , what is the order of energy of transition? Explain.

18. Explain conjugate base mechanism of base hydrolysis. What are the advantages of this mechanism?
19. Give explanation for the trans effect of halide ligands using polarization theory.
20. Discuss the uses of CD and ORD spectra.
21. Discuss the resolution method of chiral metal complexes with a suitable example.

(5 x 5 = 25)

Section C

Answer any 2 (15 marks each)

22. 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 .
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 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?
25. Discuss the different methods employed in the separation of separation of lanthanides.

(15 x 2 = 30)