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K19P 1079

Reg. No. :

Name :

III Semester M.Sc. Degree (CBSS- Reg./Suppl./Imp.)

Examination, October-2019

(2014 Admission Onwards)

CHEMISTRY

CHE 3C. 08 : INORGANIC CHEMISTRY - II

Time : 3 hours

Max. Marks : 60

SECTION - A

Answer **All** questions in **one** word or **one** sentence. Each question carries **One** mark. (8x1=8)

1. Why OH⁻ is a weaker field ligand than H₂O?
2. Which of the following ion will exhibit maximum LFSE in strong octahedral field? Cu(II), Mn(II), Co(III), Ni(II).
3. The term symbol for Cr³⁺ is.....
4. Define microstate.
5. Name the product formed when [PtCl₄]²⁻ is treated with NH₃.
6. What is chelate effect?
7. Comment on the magnetic property of ferrocene.
8. Which is more basic; ferrocene or aniline?

SECTION - B

Answer any **Eight** questions. Answer may be in **Two** or **Three** sentences. Each question carries **two** marks. (8x2=16)

9. What is spectrochemical series? Why is it called so?
10. Octahedral field splitting energy (Δ_o) is always higher than tetrahedral field splitting energy (Δ_t); why?

P.T.O.



11. Which of the following metal carbonyls can be easily reduced?
 $\text{Cr}(\text{CO})_6$, $\text{Fe}(\text{CO})_5$, $\text{Ni}(\text{CO})_4$, or $\text{V}(\text{CO})_6$.
 Give reasons.
12. What do you mean by orbital contribution to magnetic moment? Explain.
13. Why chelate effect is called an 'entropy effect'?
14. Tetrahedral complexes of cobalt (II) are increasingly coloured when compared to octahedral cobalt (II) complexes; why?
15. Discuss the changes that occur when a ligand gets coordinated to a metal ion.
16. Explain isomerisation reaction of metal complex with an example.
17. Differentiate between kinetic stability and thermodynamic stability of metal complexes.
18. Cobaltocene is readily oxidised, whereas ferrocene is not; why?
19. What is migratory insertion reaction? Explain with example.
20. Explain oxidative addition reactions of organometallics.

SECTION - C

Short paragraph questions. Answer any **Four** questions. Each question carries **Three** marks. (4×3=12)

21. On the basis of valence bond theory, explain the structure and bonding in $[\text{Ni}(\text{CO})_4]$ and $[\text{Ni}(\text{CN})_4]^{2-}$.
22. What is Jahn-Teller distortion? Comment on its spectral consequences.
23. What is meant by spin-orbit coupling? How does it affect the magnetic moment values of transition metal complexes?
24. How do Orgel diagrams differ from Tanabe-Sugano diagrams.
25. Describe any one of the theories proposed to explain trans effect.
26. Describe the relationship between stepwise stability constant and overall stability constant of a metal complex.
27. Write a note on organometallic compounds of alkali metals.
28. Discuss the mechanism of the reaction involved in alkene hydrogenation.



SECTION - D

Essay type questions. Answer **Four** questions. Each question carries **Six** marks. (4×6=24)

29. A) Describe how molecular orbital theory is useful in describing the bonding in $[\text{Co}(\text{NH}_3)_6]^{3+}$. What are its advantages when compared to VB theory?
 (OR)
 B) Describe crystal field effect on ionic radii and lattice energy of M^{2+} ions of first transition series. What are the factors that affect CFSE?
30. A) Describe the application of magnetic moment measurements in the structural investigation of nickel(II) complexes giving examples.
 (OR)
 B) Give an account of the different types of magnetic behaviour exhibited by transition metal complexes. How do they vary with temperature?
31. A) Discuss the factors that affect the stability of metal complexes. Describe the pH-metric method to determine the stability of a metal complex.
 (OR)
 B) Discuss the mechanism of the ligand substitution reactions on octahedral metal complexes.
32. A) What are the factors that favour the formation of metal-metal bonds in transition metal clusters? Discuss the structure and bonding in $[\text{Re}_2\text{Cl}_8]^{2-}$.
 (OR)
 B) Describe the mechanisms and catalytic cycle involved in Monsanto acetic acid process.