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Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2015

(CUCSS)

Chemistry

CH 3C 08—INORGANIC CHEMISTRY—II

Time : Three Hours Maximum : 36 Weightage

Part A

Answer **all** *questions.*
Each question carries 1 *weightage.*

1. Electronic spectra of lanthanides are line like. Why ?
2. What do you mean by spin only value of magnetic moment ? Calculate the spin-only magnetic moment of a manganese(II) complex in a weak field.
3. The magnetic moment of $[Mn(CN)_6]^{3-}$ is 2.8 B.M. while the magnetic moment of $[MnBr_4]^{2-}$ is 5.9 B.M. What are the geometries of the complex ions ?
4. Nickel complexes are observed to undergo substitution much faster than platinum complexes. Offer an explanation.
5. Comment on the rate of exchange of co-ordinated water by solvent water in $M(H_2O)_x^{+n}$.
6. The rate of electron transfer between $\left[Ru(o\text{-phen})_3^2\right]^{2+} - \left[Ru(o\text{-phen})_3^3\right]^{3+}$ requires no change in energy eventhough the partners are chemically distinguishable. Explain.
7. How IR spectrum is useful to study the metal-ligand vibarations ?
8. What do you mean by 'g-value' in EPR spectroscopy ?
9. Describe the synthesis of two organometallic compounds of alkali metals.
10. The υ (CO) values decreases in the order : $Ni(CO)_4\ (2060\ cm^{-1}) > Co(CO)_4^-\ (1890\ cm^{-1}) > Fe(CO)_4^{2-}\ (1790\ cm^{-1})$. Account for this observation.
11. How is Zeise's salt synthesised ? Write its structure and bonding.
12. Distinguish between bulk metals, trace metals and ultra-trace metals.
13. Name the "nature's organometallic compound". Give its oxidation state ?
14. What is superoxide dismutase ? Explain its function.

(14 × 1 = 14 weightage)

Turn over

Part B

Answer any **seven** *questions.*
Each question carries 2 *weightage.*

15. In what ways Tanabe Sugano diagrams are different from Orgel diagrams ? Explain.
16. Write a note on TIP.
17. What is trans effect ? Using trans effect, suggest a method for preparing three isomers of [Pt (NH_3) (Py) BrCl] from $[PtCl_4]^{2-}$.
18. Explain the mechanism of outer sphere redox reactions.
19. Copper (II) acetate is a dimer and the two copper atoms are strongly interacting. The EPR spectrum consists of seven lines with intensity ratios 1 : 2 : 3 : 4 : 3 : 2 : 1. Copper nucleus has an 1 value of 3/2 and copper acetate consists of a ground state that is a singlet and an excited state that is a triplet. Explain the number and relative intensity of the lines in the spectrum.
20. Discuss the bonding present in metal carbonyl complexes.
21. Describe the synthesis and structure of a metal-alkyne complex.
22. How carbenes are synthesized ? Differentiate the structures between Fischer and Schrock carbenes ?
23. What are PSI and PSII reactions. Describe their involvements in photosynthesis.
24. What are iron-sulfur proteins ? Explain their role, in biological systems.

(7 × 2 = 14 weightage)

Part C

Answer any **two** *questions.*
Each question carries 4 *weightage.*

25. Describe the Gouy method for the determination of magnetic susceptibility of a paramagnetic complex.
26. Discuss the photochemical reactions of chromium and ruthenium complexes.
27. Describe the use of Mössbauer spectra for the study of high and low spin complexes of iron (II) and iron (III).
28. How ferrocene is synthesized ? Describe its reactions.

(2 × 4 = 8 weightage)