

Roll No.

Total No. of Pages : 03

Total No. of Questions : 11

M.Sc (Chemistry) (2018 Batch) (Sem.-2)

INORGANIC CHEMISTRY-II

Subject Code : CHL-411-18

M.Code : 75981

Time : 3 Hrs.

Max. Marks : 70

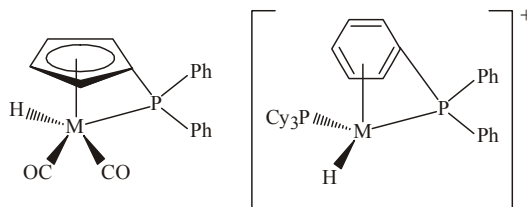
INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains EIGHT questions carrying FIVE marks each and students have to attempt any SIX questions.
3. SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.

SECTION-A

1. Write briefly :

- (a) The following OMCs are stable and have a second row transition metal at their center. Find out the metal.



- (b) Uranium-238 decays to form thorium-234 with a half-life of 4.5×10^9 years. How many years will it take for 75% of the uranium-238 to decay?
- (c) Name the radioactive series whose end product is $^{209}\text{Bi}_{83}$ and $^{207}\text{Pb}_{82}$.
- (d) Draw structures for (i) $\text{B}_{12}\text{H}_{12}^{2-}$ and (ii) P_4S_{10} .
- (e) What is Geiglar-Nutall law?
- (f) If complex $[\text{W}(\text{Cp})_2(\text{CO})_2]$ and $[\text{Ti}(\text{Cp})_4]$ follows 18e- rule. What is the Hapticity of Cp?

- (g) The reaction of CrCl_3 with liquid ammonia gives principally $[\text{Cr}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ but when traces of KNH_2 is present the main product is $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$. Explain
- (h) Ligands such as nitrite, azide etc. are as strong nucleophiles as hydroxide, but these do not influence the rate of hydrolysis of ammine octahedral complexes. Explain why?
- (i) Formulate and draw the structure of a simplest neutral compound having Fe, cp and COT that conforms to follow the 18 electron rule.
- (j) Predict the structures of (i) $[\text{OS}_8(\text{CO})_{22}]^{2-}$ and (ii) $[\text{OS}_{10}\text{C}(\text{CO})_{24}]^{2-}$

SECTION-B

- What are fluxional molecules? Discuss how the dynamic equilibria is achieved in allyl complexes. How is it characterized?
- What are carboranes? Write its synthesis. How many isomers are possible for closo-decarborane?
- Discuss the synthesis, structure and uses of Tungsten carbide.
- Explain the chemistry of isopoly and heteropoly anions of molybdenum and tungsten.
- Suggest methods for preparation of three isomers of $[\text{Pt}(\text{NH}_3)(\text{py})(\text{Cl})(\text{Br})]$.
- Discuss the mechanism of outer sphere (self-exchange) reactions of metal complexes.
- Give an account of various components of a nuclear reactor.
- Discuss the application of
 - Co-60,
 - I-131,
 - C-14,
 - C-11,
 - Tl-201 and
 - Tc-99m in medicine.

SECTION-C

10. With the help of a suitable example, discuss synthesis, chemical reactivity and bonding in metallocenes.

OR

Give a brief description of subatomic particles found in the nucleus other than protons and neutrons. Also, discuss the nature of forces which hold nucleons together in a small nucleus.

11. Explain the SN1 (CB) mechanism of base hydrolysis and the factors affecting its rate of reaction. Also, explain why it cannot be explained by SN2 mechanism.

OR

Explain the bonding and structure of diborane, tetraborane and pentaborane. Show the relationship between closo, nido and arachno structures with no. of vertices = 7, 8, 9 and 10.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.