2022

B.A./B.Sc.

Sixth Semester

CORE – 13

CHEMISTRY

Course Code: CHC 6.11

(Inorganic Chemistry – IV)

Total Mark: 70 *Pass Mark: 28*

Time: 3 hours

Answer five *questions, taking* one *from each unit.*

UNIT–I

1. (a) What is common ion effect? Discuss with an example. 1+4=5
   (b) Why are cations divided into different groups? Discuss the removal of interfering radicals of phosphate and borate. 1+2+2=5
   (c) Name the two cations present in Group III A. Write the significance of solubility product. 1+3=4

2. (a) Define qualitative analysis. Explain the solubility product. 1+4=5
   (b) What are interfering radicals? How do you confirm the presence of NH_4^+ and K^+ ions in a given inorganic salt? 1+2+2=5
   (c) Write two cations present in Group IV. Give the application of solubility product and common ion effect in separation of cations into groups. 1+3=4

UNIT–II

3. (a) Discuss the shape of carbon monoxide according to VBT. 4
   (b) Draw the shape of the following and mention the hybridization involved.
   (i) $Ni(CO)_4$
   (ii) $Fe(CO)_5$
   (iii) $Cr(CO)_6$ 2×3=6

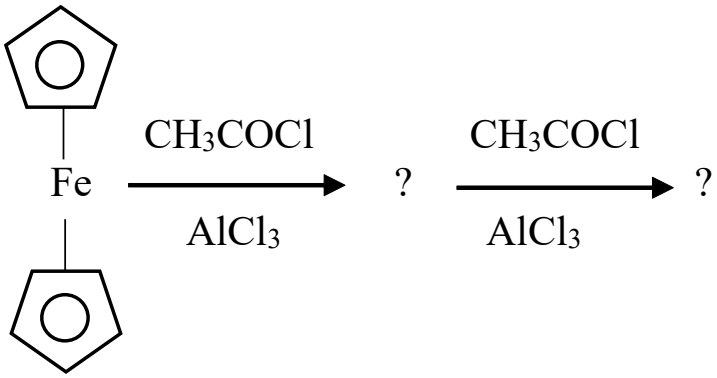
(c) What are Dihapto and Trihapto ligands? Give example for each. 2+2=4

4. (a) Explain ionic organometallic compounds with examples and give characteristics of it. 2+4=6
   (b) Explain 18 electron rule with example. 1+2=3
   (c) Explain the structure of the following by VBT: 2½×2=5
   (i) $Fe_2(CO)_9$
   (ii) $Mn_2(CO)_{10}$

UNIT–III

5. (a) How is Zeise's salt prepared? Discuss the structure. 3+3=6
   (b) Define Schlenk equilibrium. 3
   (c) Discuss in detail the structure and bonding in trialkyl aluminium. 5

6. (a) Discuss polymerization of ethene. Compare the aromatic behaviour of ferrocene and benzene. 3+3=6

(b) 

1½+1½=3

(c) How is ferrocene prepared? Mention some physical and chemical properties of ferrocene. 2+1½+1½=5

UNIT–IV

7. (a) What are labile complexes? Discuss with an example. 1+2=3
   (b) Explain the pi-bonding theory of trans effect. 5
   (c) On the basis of CFT discuss the cause of lability and inertness of octahedral complexes. 6

8. (a) Discuss the factors affecting the stability of complexes in solutions with reference to basic nature of ligands and template effect. 2½+2½=5

(b) What is acid hydrolysis? Discuss acid hydrolysis of octahedral complexes. 1+3=4

(c) Write any two evidences to establish that substitution in square planar complexes proceeds through SN^2 mechanism. 2½+2½=5

UNIT–V

9. (a) Write the importance of homogenous catalysis in industrial processes with reference to organometallic compounds. 4

(b) Discuss in detail the synthesis of acetaldehyde from ethane with reaction mechanism. 6

(c) Give the reaction mechanism of synthesis gas production by metal carbonyl complexes. 4

10. (a) What is 1, 2-insertion reaction? Give an example. 2

(b) Explain in detail the hydrogenation of alkene by Wilkinson catalyst. 6

(c) Write notes on the following: 2×3=6

(i) Oxo process

(ii) Fischer-Tropsch reaction

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