

Bachelor of Science (B.Sc.) Semester-IV (C.B.S.) Examination

CH-401: CHEMISTRY (Inorganic Chemistry)

Paper-I

Time : Three Hours]

[Maximum Marks : 50

N.B. :- (1) All **five** questions are compulsory and carry equal marks.

(2) Write equations and draw diagrams wherever necessary.

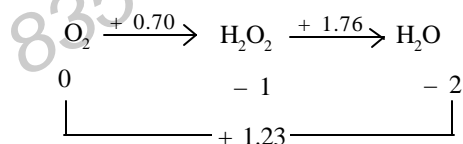
1. (A) Explain inner and outer orbital complexes with examples. How does VBT account for diamagnetic nature of $[\text{Co}(\text{NH}_3)_6]^{3+}$? 5
- (B) What are chelates ? Give classification of chelates formed by bidentate ligands. Give any two industrial applications of chelates. 5

OR

- (C) Explain how many Cl^- ions will be precipitated when the complexes $\text{CoCl}_3 \cdot 4\text{NH}_3$ and $\text{CoCl}_3 \cdot 6\text{NH}_3$ are treated with AgNO_3 . 2½
- (D) Define EAN. Calculate EAN in following complex ions :
 (i) $[\text{Co}(\text{NH}_3)_6]^{3+}$ and
 (ii) $[\text{Ni}(\text{CN})_4]^{2-}$ 2½
- (E) Explain the terms with examples :
 (i) Complex ion
 (ii) Coordination number
 (iii) Central metal ion 2½
- (F) Write IUPAC names for following complexes :
 (i) $\text{Na}_3[\text{Co}(\text{NO}_2)_6]$
 (ii) $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$
 (iii) $[\text{Co}(\text{en})_2(\text{NH}_3)_2]\text{Cl}_3$. 2½
2. (A) (i) Discuss geometrical isomerism exhibited by 4-coordinated complexes.
 (ii) Explain with examples :
 (a) Ionization isomerism and
 (b) Ligand isomerism. 5
- (B) What is Latimer diagram ? Explain Latimer diagram of chlorine in acidic medium. 5

OR

- (C) Explain optical isomerism exhibited by 6-coordinated complexes. 2½
- (D) Construct Frost diagram for oxygen from given Latimer diagram. 2½



- (E) Explain Pourbaix diagram of Iron. 2½
- (F) Explain Linkage and co-ordination isomerism with suitable examples. 2½

3. (A) What are organometallic compounds ? How are they classified on the basis of the nature of metal-carbon bond ? Give any one method for preparation of methyl lithium and triethyl aluminium. 5

(B) What are metal carbonyls ? Give any two methods for preparation of monomeric metal carbonyls ? Discuss the structure and bonding in $\text{Cr}(\text{CO})_6$. 5

OR

(C) Discuss homogeneous hydrogenation of alkenes with mechanism. 2½

(D) Give IUPAC names of following compounds :



(E) Discuss bonding in metal ethylenic complexes. 2½

(F) Discuss structure and bonding in $\text{Ni}(\text{CO})_4$. 2½

4. (A) Discuss structure and function of Hemoglobin. 5

(B) What is HSAB principle ? Give applications of HSAB principle in explaining :

(i) Occurrence of metal in nature and

(ii) Solubility of salts with examples. 5

OR

(C) What do you understand by sodium pump ? 2½

(D) Explain the role of essential trace elements in biological system. 2½

(E) Write a note on symbiosis. 2½

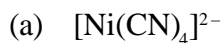
(F) Explain AgI_2^- exists as a stable compound while AgF_2^- does not. 2½

5. Attempt any **ten** of the following :

(i) What is ambident ligand ?

(ii) Draw structure of metal-EDTA complex.

(iii) State type of hybridisation in :



(iv) What are Frost diagrams ?

(v) Define disproportionation.

(vi) Draw structures of two optical isomers of $\text{Cis}[\text{Co}(\text{NH}_3)_4 \text{Cl}_2]^+$

(vii) What are ylides ?

(viii) Draw structure of Zeise's salt.

(ix) What is the action of Br_2 on $\text{Ni}(\text{CO})_4$?

(x) What is Antagonism ?

(xi) What are metalloporphyrins ?

(xii) Classify the following as Hard and Soft acids and bases :

