

Bachelor of Science (B.Sc.) Semester—IV Examination
(New & Old)

CH-401 : CHEMISTRY (Inorganic Chemistry)

Compulsory Paper—I

(New)

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) What are postulates of valence bond theory for co-ordination? Explain the structure and magnetic properties of $[\text{Fe}(\text{CN})_6]^{3-}$ using VBT. 5
- (B) What are Chelates? Give classification of chelates formed by bidentate ligands. Give any two applications of chelates in chemical analysis. 5

OR

- (C) Discuss postulates of Werner's theory of co-ordination. 2.5
- (D) Give IUPAC names of the following :
(i) $[\text{Co}(\text{en})_2(\text{NO}_2)]^+$
(ii) $[\text{Ag}(\text{CN})_2]^-$ 2.5
- (E) Define EAN. Calculate EAN in the following :
(i) $[\text{Co}(\text{en})_3]^{3+}$
(ii) $[\text{Fe}(\text{CN})_6]^{4-}$ 2.5
- (F) Differentiate between double salt and co-ordination compounds. 2.5
2. (A) (i) Explain optical isomerism in octahedral complexes.
(ii) Discuss Ionization and linkage isomerism with example of each. 5
- (B) (i) Write a short note on stability field of water.
(ii) Draw and explain Frost diagram of oxygen using following Latimer diagram



OR

- (C) What is Pourbaix diagram? Draw it for Iron species. 2.5
- (D) Explain disproportionation reaction and comproportionation with one example each. 2.5
- (E) Explain geometrical isomerism in square planar complexes. 2.5
- (F) Explain co-ordination isomerism and ligand isomerism with example. 2.5

(Contd.)

3. (A) State Beer-Lambert's Law. Explain the method for estimation of Cu(II) as copper ammonia complex by colorimetry. Draw schematic diagram of single beam photoelectric colorimeter. 5

(B) Explain principle and technique of ascending paper chromatography. Calculate Rf values of Ni^{2+} and Co^{2+} if distance travelled by Ni^{2+} , Co^{2+} and solvent are 0.5 cm, 6.5 cm and 8.2 cm respectively. 5

OR

(C) Define :

(i) Ion exchange capacity

(ii) Chromatography

(iii) Elution. 2.5

(D) Discuss deviations from Beer-Lambert's Law. 2.5

(E) Explain applications of ion exchange chromatography. 2.5

(F) Draw schematic diagram of single beam spectrophotometer. 2.5

4. (A) What are Phosphazenes ? Explain structure and bonding in $(\text{NPCl}_2)_3$. 5

(B) What is meant by hardness of water ? Give its types. Explain the method for determination of hardness of water. 5

OR

(C) Write a note on silicon oil. 2.5

(D) How does silicone react with :

(i) LiAlH_4

(ii) RMgBr . 2.5

(E) Define COD of water. How is it analysed ? 2.5

(F) What is pH ? How pH of water is determined ? 2.5

5. Attempt any TEN of the following :

(1) Define co-ordination number.

(2) Write the type of hybridization involved in $[\text{Co}(\text{CN})_6]^{3-}$ and $[\text{Fe}(\text{CN})_6]^{3-}$.

(3) How many moles of AgCl will be precipitated in $\text{CoCl}_2 \cdot 6\text{NH}_3$ and $\text{CoCl}_2 \cdot 4\text{NH}_3$ on treatment with AgNO_3 ? <https://www.rtmnuonline.com>

(4) Draw structure of geometrical isomers of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ ion.

(5) What is Latimer diagram ?

(6) Draw structure of optical isomer exhibited by tetrahedral complex.

(7) Convert 10% transmittance into absorbance.

(8) Define adsorption chromatography.

(9) Give two applications of solvent extraction.

(10) Give any two applications of phosphazenes.

(11) Give IUPAC name of $(\text{CH}_3)_2\text{Si}(\text{OH})_2$. 1×10=10

(12) What is the unit of TDS ?

(Contd.)