

2023
B.A./B.Sc.
Fourth Semester
CORE – 8
CHEMISTRY
Course Code: CHC 4.11
(Inorganic Chemistry - III)

Total Mark: 70
Time: 3 hours

Pass Mark: 28

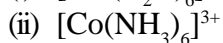
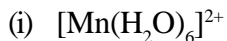
Answer five questions, taking one from each unit.

UNIT-I

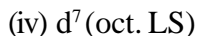
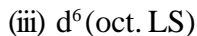
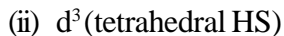
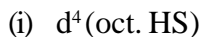
1. (a) Write the formulae of the following complexes: 1×4=4
- (i) Diamminesilver(I) chloride
 - (ii) Hexamminecobalt (III) chloride
 - (iii) Diamminetetrachloridoplatinum(IV)
 - (iv) Potassiumhexacyanidoferrate(II)
- (b) According to VBT, explain outer and inner orbital complexes with one example each. 5
- (c) Explain with an example each of the following structural isomerism: 2½×2=5
- (i) Coordination isomerism
 - (ii) Linkage isomerism
2. (a) Write the main postulates of valence bond theory of coordination compounds. 4
- (b) Discuss stereoisomerism in coordination compounds with examples. 5
- (c) Based on Werner's theory, deduce the structure of $\text{CoCl}_3 \cdot 4\text{NH}_3$ and $\text{CoCl}_3 \cdot 3\text{NH}_3$. 2½+2½=5

UNIT-II

3. (a) Explain the magnetic nature of the following complex ions on the basis of CFT: 2×3=6

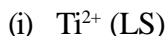


(b) Calculate CFSE of the following: 2×4=8

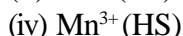
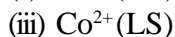
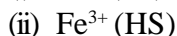


4. (a) Explain the effect of nature of ligands on the magnitude of Δ . 3

(b) Find out which ion or ions have strong Jahn-Teller distortion.



$1\frac{1}{2} \times 4 = 6$



(c) Explain with neat diagrams, the splitting of d-orbitals in tetrahedral complexes. 5

UNIT-III

5. (a) What do you mean by crystal field splitting and d-d transition? 1½+1½=3

(b) Give the general electronic configuration of transition elements. Write a note on transition series. 1+3=4

(c) What do you mean by paramagnetic and diamagnetic substances? 2+2=4

(d) Explain why the electronic configuration of Cr and Cu are anomalous. 3

6. (a) What are the various oxidation states of titanium and chromium? Give the most common oxidation state of titanium and chromium. 4

(b) Write notes on transition elements with respect to 2×3=6

(i) atomic and ionic radii

(ii) oxidation states

(iii) catalytic properties

(c) Write the differences between first, second and third transition series. 4

UNIT-IV

7. (a) What are lanthanoids? Discuss their magnetic properties. 1+3=4
(b) Compare the oxidation states exhibited by the lanthanoids and actinoids. 4
(c) Write the electronic configuration of Pa ($Z = 91$) and Am ($Z = 95$). 2
(d) Give any four point each about the similarities and dissimilarities of actinoids and lanthanoids. 4
8. (a) Discuss the colouration shown by the lanthanoids and actinoids. 5
(b) Give the electronic configuration of Nd ($Z = 60$) and Sm ($Z = 62$). 2
(c) Explain how would you isolate lanthanoids by ion exchange method. 4
(d) Write short notes on the ionic radii and spectral properties of actinoids. 3

UNIT-V

9. (a) Name some of the essential trace elements in biological system along with their effects of excesses and insufficiencies. 5
(b) Discuss the stereochemistry of carbonic anhydrase. 5
(c) What are crown ethers? Discuss its selectivity in forming complexes. 1+3=4
10. (a) Mention some toxic effects of lead and cadmium. 2+2=4
(b) What are metalloporphyrins? Discuss the structure of chlorophyll in detail. 1+4=5
(c) Discuss the biological role of Ca^{2+} . 5
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