

[This question paper contains 4 printed pages.]

1911

Your Roll No.

B.Sc. Prog. / III

E

CH-301 - INORGANIC CHEMISTRY

(NC - Admissions of 2008 and onwards)

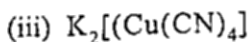
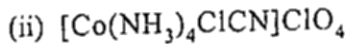
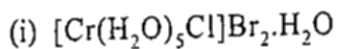
Time : 2 Hours

Maximum Marks : 50

(Write your Roll No. on the top immediately
on receipt of this question paper.)

Attempt any four questions.
Each question carries 12½ marks.

1. (a) Give the IUPAC names of the following complexes :



(b) Give the formula for each complex named :

(i) Ethylenediaminetetraiodochromate(III) ion

(ii) Pentaquachlorochromium(III) bromide

P.T.O.

- (iii) Pentaamminecobalt(III)- μ -hydroxo-dichlorobisethylenediaminecobalt(III) chloride
- (c) Define CFSE and calculate its value in terms of Dq or Δ_0 for d^4 and d^6 systems for an octahedral complex with weak and strong ligands.
- (d) Why does no monomeric carbonyl exist for manganese ? (3,3,5,1½)
2. (a) Explain briefly *any five* of the following:
- Tetrahedral complexes are generally high spin.
 - CO is a poor base towards Lewis acids such as BF_3 but forms stable complexes with transition metals.
 - Transition metals are good at forming complexes.
 - Ce (+III) is a reducing agent.
 - Ti^{3+} is paramagnetic while Ti^{4+} is diamagnetic.
 - Cyanide complexes show linkage isomerism.
- (b) Verify that the central metal atom(s) in $Ni(CO)_4$, $[V(CO)_6]^-$ and $Co_2(CO)_8$ has 18 valence electrons.

- (c) What happens when a solution of potassium ferrocyanide is treated with copper(II) sulphate?
(1½×5,3,2)
3. (a) Give the structures of all the stereoisomers of the complex ion $[\text{Cr}(\text{oxalate})_2\text{Cl}_2]^{3-}$.
- (b) What is lanthanide contraction? Discuss how it affects the properties of the pairs of elements Zr-Hf and Mo-W.
- (c) Discuss the bonding in Zeise's salt.
- (d) Differentiate between inner orbital and outer orbital complexes with one example each. (3,4,3½,2)
4. (a) What is Jahn-Teller distortion? State the theorem governing it. How does it affect the structure of Cu(II) and Ti(III) complexes?
- (b) Why are transition metal compounds coloured? Are potassium permanganate and potassium dichromate coloured due to the same reason? Explain.
- (c) Explain what happens when:
- (i) H_2S is bubbled through acidified potassium dichromate solution

- (ii) Sodium nitroprusside is treated with sodium sulphide
- (iii) Ferric chloride reacts with potassium ferrocyanide (4,4,1½×3)
5. (a) Discuss briefly the similarities and differences between lanthanide elements and actinide elements.
- (b) Nickel complexes show both square planar and tetrahedral geometry. Explain.
- (c) Explain with examples hydrate isomerism and ionisation isomerism in coordination compounds. (4½,4,4)