

CHEMISTRY STUDY MATERIALS FOR CLASS 12

(NCERT BASED QUESTIONS - ANSWERS OF CHAPTER - 09)

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Co-ordination Compounds

Question 4: What is meant by unidentate, bidentate and Ambidentate ligands? Give two examples for each.

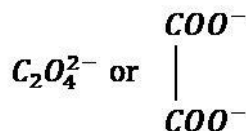
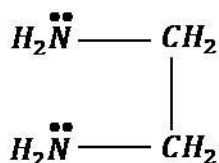
Solution 4: A ligand may contain one or more unshared pairs of electrons which are called the donor sites of ligands. Now, depending on the number of these donor sites, ligands can be classified as follows:

(a) **Unidentate ligands:** Ligands with only one donor sites are called unidentate ligands. For e.g., NH_3 , Cl^- etc.

(b) **Bidentate ligands:** Ligands that have two donor sites are called bidentate ligands. For e.g.,

.. (i) Ethane-1,2-diamine

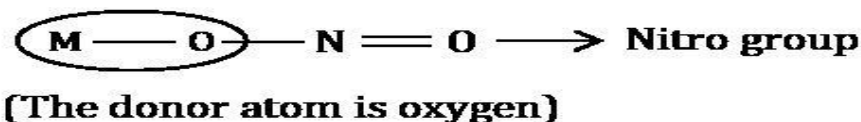
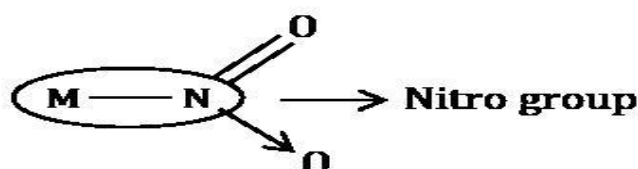
(ii) Oxalate ion



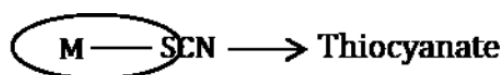
(b) **Ambidentate ligands:** Ligands that can attach themselves to the central metal atom through two different atoms are called ambidentate. ligands.

For example:

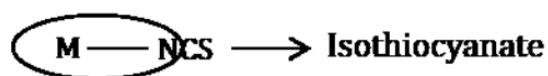
(i) Nitro group



(ii) Thiocyanate

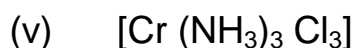
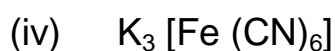


[The donor atom is S]

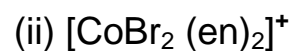
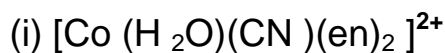


[The donor atom is N]

Q. 5: Specify the oxidation numbers of the metals in the following coordination entities:



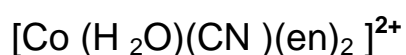
Solution 5:



Let the oxidation number of Co be x. Let the oxidation number of Co be x.

The charge on the complex is +2.

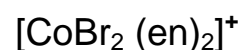
The charge on the complex is +1.



$$x + 0 + (-1) + 2(0) = +2$$

$$x - 1 = +2$$

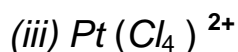
$$x = +3$$



$$x + 2(-1) + 2(0) = +1$$

$$x - 2 = +1$$

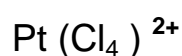
$$x = +3$$



Let the oxidation number of Pt be x. Let the oxidation number of Fe be x.

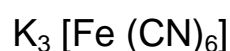
The charge on the complex is +2.

The charge on the complex is 0.



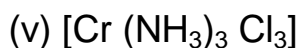
$$x + 4(-1) = +2$$

$$x - 4 = +2$$



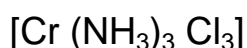
$$3(+1) + x + 6(-1) = 0$$

$$x = +3$$



Let the oxidation number of Cr be x.

The charge on the complex is 0.



$$x + 3(0) + 3(-1) = 0 \quad \text{or, } x - 3 = 0 \quad \text{or, } x = 3$$

Question 6: Using IUPAC norms write the formulas for the following:

(i) Tetrahydroxozincate(II)

(ii) Potassium tetrachloridopalladate(II)

(iii) Diamminedichloridoplatinum(II)

(iv) Potassium tetracyanonickelate(II)

(v) pentaamminenitrito-O-cobalt(III)

(vi) Hexaamminecobalt(III)sulphate

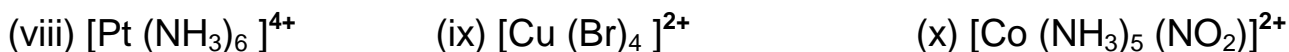
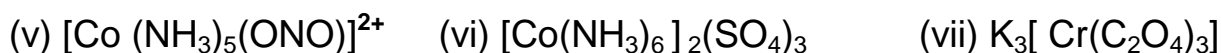
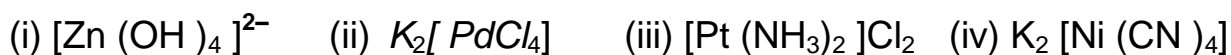
(vii) Potassium tri(oxalato)chromate(III)

(viii) Hexaammineplatinum(IV)

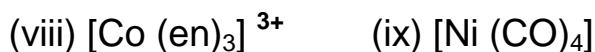
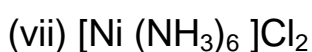
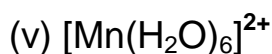
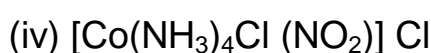
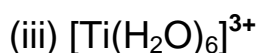
(ix) Tetrabromidocuprate(II)

(x) Pentaamminenitrito-N-cobalt(III)

Solution 6:



Question 7: Using IUPAC norms write the systematic names of the following:



Solution 7:

(i) Hexaamminecobalt(III) chloride

(ii) Diamminechlorido(methylamine)platinum(II) chloride

(iii) Hexaqua titanium(III) ion (iv) Tetraamminichloridonitrito-N-Cobalt(III) chloride

(v) Hexaquamanganese(II) ion (vi) Tetrachloridonickelate(II) ion

(vii) Hexaamminenickel(II) chloride (viii) Tris(ethane-1, 2-diammine) cobalt(III) ion

(ix) Tetracarbonylnickel(0)
