

Atomic Energy Central School, Indore

Class XII Chemistry CO-ORDINATION COMPOUNDS

Worksheet 6/6

Questions

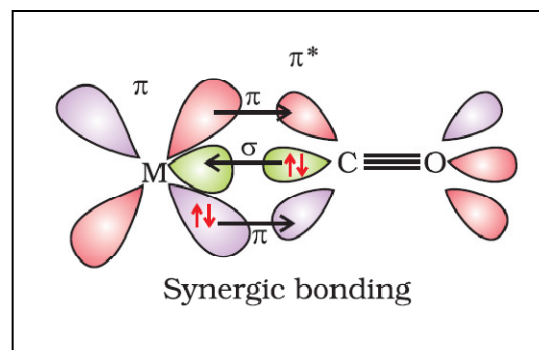
1. Discuss the nature of bonding in metal carbonyls.
2. Calculate the overall complex dissociation equilibrium constant for the $[\text{Cu}(\text{NH}_3)_4]^{2+}$ ion, given that β_4 for this complex is 2.1×10^{13} .
3. Write short answers for the following:
 - (i) Name the co-ordination compound used in the treatment of lead poisoning.
 - (ii) Name the coordination compound of platinum that effectively inhibit the growth of tumours.
 - (iii) Write the formula of Wilkinson catalyst which is used for the hydrogenation of alkenes.
 - (iv) Name the co-ordination compound used in the detection of Ni^{2+} in salt analysis.
 - (v) Write the formula of the complex formed in the brown ring test for NO_3^- .
 - (vi) Which metal is present in the co-ordination compound cyanocobalamin?
 - (vii) How is purification of Nickel achieved?
 - (viii) Write the co-ordination compound used in the estimation of hardness of water.

Answers

1. The homoleptic carbonyls (compounds containing carbonyl ligands only) are formed by most of the transition metals.

The metal-carbon bond in metal carbonyls possess both s and p character. The M–C σ bond is formed by the donation of lone pair of electrons on the carbonyl carbon into a vacant orbital of the metal. The M–C π bond is formed by the donation of a pair of electrons from a filled d orbital of metal into the vacant antibonding π^* orbital of carbon monoxide.

The metal to ligand bonding creates a synergic effect which strengthens the bond between CO and the metal.



2. The dissociation constant of coordination compounds is defined as the reciprocal of the formation constant.

$$\text{So, dissociation equilibrium constant for the } [\text{Cu}(\text{NH}_3)_4]^{2+} \text{ ion} = 1 / 2.1 \times 10^{13} \\ = 0.476 \times 10^{-13}$$

3. (i) EDTA (Ethylenediaminetetraacetate) (v) $[\text{Fe}(\text{H}_2\text{O})_5(\text{NO})]^{2+}$
(ii) *cis*-platin (vi) Cobalt
(iii) $[(\text{Ph}_3\text{P})_3\text{RhCl}]$ (vii) impure nickel is converted to $[\text{Ni}(\text{CO})_4]$, which is decomposed to yield pure nickel.
(iv) DMG (dimethylglyoxime) (viii) Na_2EDTA