Coordination isomerism occurs compounds containing complex anionic and cationic parts can be thought of as occurring by interchange of some ligands from the cationic part to the anionic part. Hence, there are two complex compounds bound together, one with a negative charge and the other with a positive charge. In coordination isomers, the anion and cation complexes of a coordination compound exchange one or more ligands.

Exercise \(\PageIndex{1}\)

Are \([\ce{Cu(NH3)4][PtCl4]}\) and \([\ce{Pt(NH3)4][CuCl4]}\) coordination isomers?

Solution

Here, both the cation and anion are complex ions. In the first isomer, \(\ce{NH3}\) is attached to the copper and the \(\ce{Cl^-}\) are attached to the platinum. In the second isomer, they have swapped.

Yes, they are coordination isomers.

Exercise \(\PageIndex{2}\)

What is one coordination isomer of \([\ce{Co(NH3)6][Cr(C2O4)3]}\)?

Solution

Coordination isomers involve swapping the species from the inner coordination sphere to one metal (e.g., cation) to inner coordination sphere of a different metal (e.g., the anion) in the compound. One isomer is completely swapping the ligand sphere, e.g, \([\ce{Co(C2O4)3][Cr(NH3)6]}\).

Alternative coordination isomers are \([\ce{Co(NH3)4(C2O4)][Cr(NH3)2(C2O4)2]}\) and \([\ce{Co(NH3)2(C2O4)2[Cr(NH3)4(C2O4)3]}\).

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