Polyamine Amino Acid Ligand Design by Metal Template Strategy

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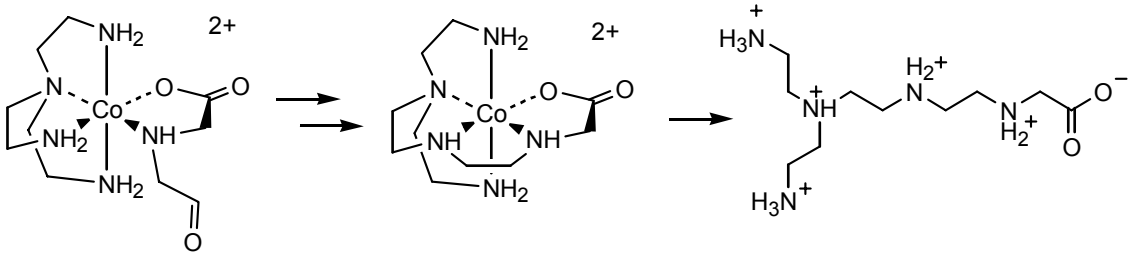
Cobalt(III) complexes serve as useful templates for asymmetric synthesis of amino acids and polyamines, *inter alia*. The substitutional inertness and the polarizing effect of the metal centre combine to affect ligand reactivity, providing activation and/or protection of several ligand functionalities at the same time. A convenient starting point for such synthesis is provided by complex synthons of the type $[(amine)_4Co(O_2CCH{=}NH)]^{2+}$ which can serve as glycine equivalents for α-amino acid synthesis. The imine functionality yields to attack by a number of carbanionic nucleophiles, and chiral amine ligands provide an asymmetric environment in which addition reactions can be made highly stereospecific.

Linear, branched polyamines and their derivatives play vital roles in biology, but their organic syntheses are usually not straightforward. Synthetic avenues to such molecules have been developed, partly by the above-mentioned strategy but also by use of precursor complexes in which properly functionalised ligand segments are stereospecifically assembled around the metal.



Stereospecific intramolecular imine formation with an amine group of the tren ligand occurs readily. Subsequent reduction of the formed imine provided complexes of novel pentaamino acidates which could be readily liberated by reduction of the inert metal centre to the labile cobalt(II) state.