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Base Hydrolysis Kinetics of Cobalt(III) Spiro-Octaamine Dimer

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Abstract: The preparation and characterisation of a cobalt (III) complex of octaaza ligand, 5, 5'-bis(4-amino-2-azabutyl)-1,9-diamino-3,7-diazanonane (octaam) is described. The base hydrolysis kinetics of bis cobalt(III) of octaam has been studied spectrophotometrically by the stopped-flow technique. A consequent reaction is observed in the base hydrolysis of the spiro-octaamine with the fast reaction having $k_{OH} = 3.55 \text{ M}^{-1}\text{s}^{-1}$ and the slower reaction $k_{OH} = 0.72 \text{ M}^{-1}\text{s}^{-1}$ at 298 K with $\Delta H^\ddagger = 89 \text{ kJ/mol}$ for the fast stage and $\Delta H^\ddagger = 102 \text{ kJ/mol}$ for the slow stage ($I = 0.4 \text{ M NaClO}_4$). The fast reaction is assigned to the hydrolysis of the trans diaqua and the slower to further hydrolysis of the remaining Cl ions. The reaction appears to proceed predominantly by a D_{CB} (dissociative conjugate base) mechanism.

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