Enantiopure trinuclear lanthanide(III) complexes: cooperative formation of $Ln_3(\mu_3\text{-}OH)_2$ core within the macrocycle.

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Streszczenie

The large trioxahexaaza chiral macrocyclic amine L binds three lanthanide(III) ions (Sm(III), Eu(III) and Tm(III)) in such a way that the Ln(III) ions are bridged by the phenolate oxygen atoms of the macrocycle and additional hydroxo bridges. The formation of symmetrical trinuclear complexes is confirmed by ^{1}H NMR, ESI-MS and elemental analyses. X-ray crystal data for the Eu(III) complex reveal the presence of the $Ln_3(\mu_3\text{-}OH)_2$ cluster in the centre of the macrocycle. On the other hand, the larger La(III) or Pr(III) lanthanide ions form dinuclear complexes with the macrocycle L under similar conditions. The titration of the macrocycle L with europium(III) nitrate and sodium hydroxide solutions indicates formation of mononuclear and trinuclear species, while no substantial amount of dinuclear complexes are observed. The formation of the $Ln_3(\mu_3\text{-}OH)_2$ core in the trinuclear complexes is cooperative, i.e. the binding of the third Ln(III) ion by the macrocycle L is stronger than the binding of the second Ln(III) ion.

Słowa kluczowe

lanthanides, macrocycles, Trinuclear complexes, Chiral complexes, Cooperativity, X-ray crystal structures

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