SYMBOLISM:

The following symbolism has been used in the present work. In general, charges on metal ions, ligands and complexes have been omitted for the sake of clarity. Molar concentration scale has been used for the evaluation of the stability constants; they are actually the 'stoichiometric constants'.

- $B$ Experimental pH-meter reading
- $\tilde{\eta}_H$ Formation function of ligand
- $\tilde{\eta}$ Formation function of complex
- $\tilde{\eta}_1$ Formation function of the primary hydroxo complex
- $pL$ Free ligand exponent
- $T_M^0$ Total metal concentration
- $T_A^0$ Total (primary) ligand concentration
- $T_L^0$ Total (Secondary) ligand concentration
- $E^0$ Total concentration of reference acid
- $N$ Concentration of alkali used
- $\mu$ Ionic strength of the titration set
- $t$ Experimental temperature
- $H_A^Y$ Protonated primary ligand
- $A$ Deprotonated primary ligand
- $HyL$ Protonated secondary ligand
L  
Protonated secondary ligand

$K_n^H \neq K_L^H$

Proton-ligand stability constant

$K_{MA}$

Metal-ligand stability constant of MA

$(M + A = MA)$

$K_{ML}^M$

Metal-ligand stability constant of ML

$(M + L = ML)$

$K_{MAL}^M$

Metal-ligand stability constant of MAL

$(MA + L = MAL)$

$K_{MLA}^M$

Metal-ligand stability constant of MLA

$(ML + A = MLA)$

$\Delta \log K$

$log K_{MAL}^M - log K_{ML}^M = log K_{MLA}^M - log K_{MA}^M$

$B_{MAL}^M$

Overall-stability constant of MAL

$(M + A + L \leftrightarrow MAL)$

$log B_{MAL}^M = log K_{MA}^M + log K_{MAL}^M$

$log K_{MLA}^M = log B_{MAL}^M - log K_{ML}^M$

$K_{(d)MA}$

Equilibrium constant for the displacement reaction $ML + A = MA + L$

$K_{(a)MAL}^M := K(a)_{statistical value of K_{MAL}^M}$

$\delta \log K$

$log K_{M'-L}^M - log K_{ML}^M$

Where M and M' are two successive lanthanide metal ions combining with the same ligand L

$\Delta G$

Free energy change accompanying the formation of the 1:1:1 ternary complex MAL in accordance with the equilibrium, $MA + L \leftrightarrow MAL$

$\Delta G = -2.303RT \log K_{MAL}^M$
$S^0_M$ Standard entropy of lanthanide metal ion

$E^{0}_{(v)}$ Standard oxidation potential of lanthanide metal ion

$\Xi$ I Sum of first three ionization potentials of lanthanide metal ion

$L$ Total angular momentum of lanthanide metal ion

$\sigma$ Standard deviation