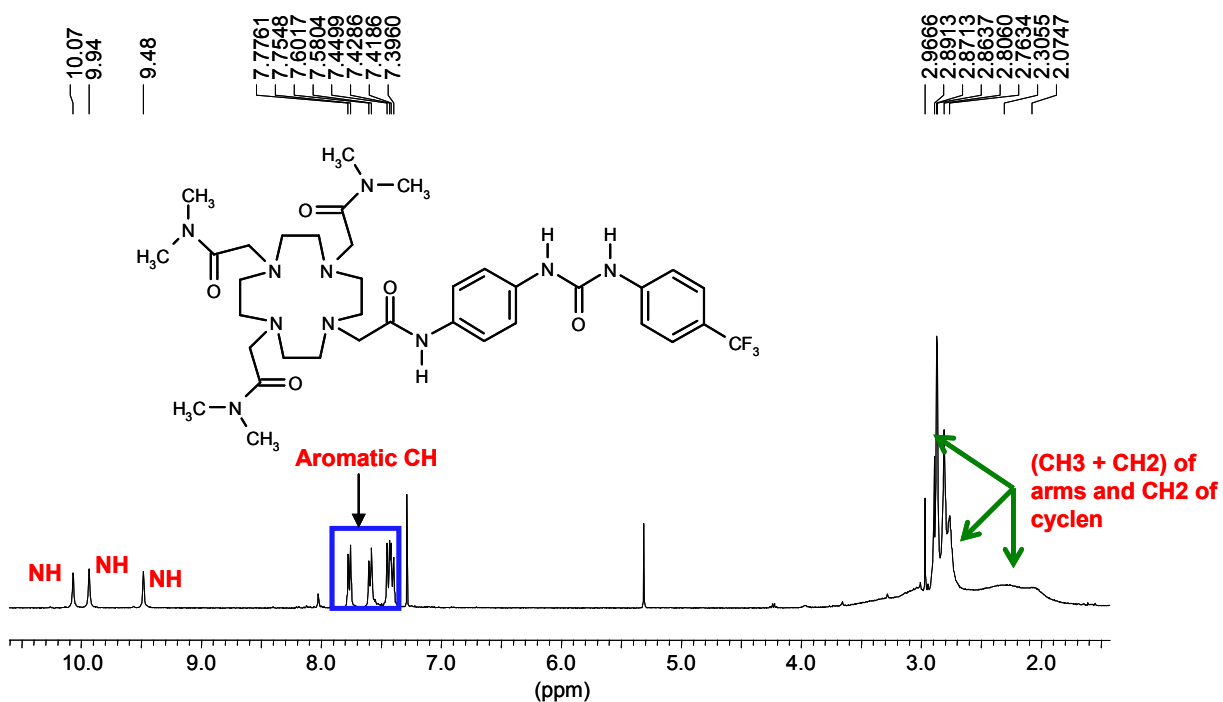


# The recognition of anions using delayed lanthanide luminescence: The use of Tb(III) based urea functionalised cyclen complexes

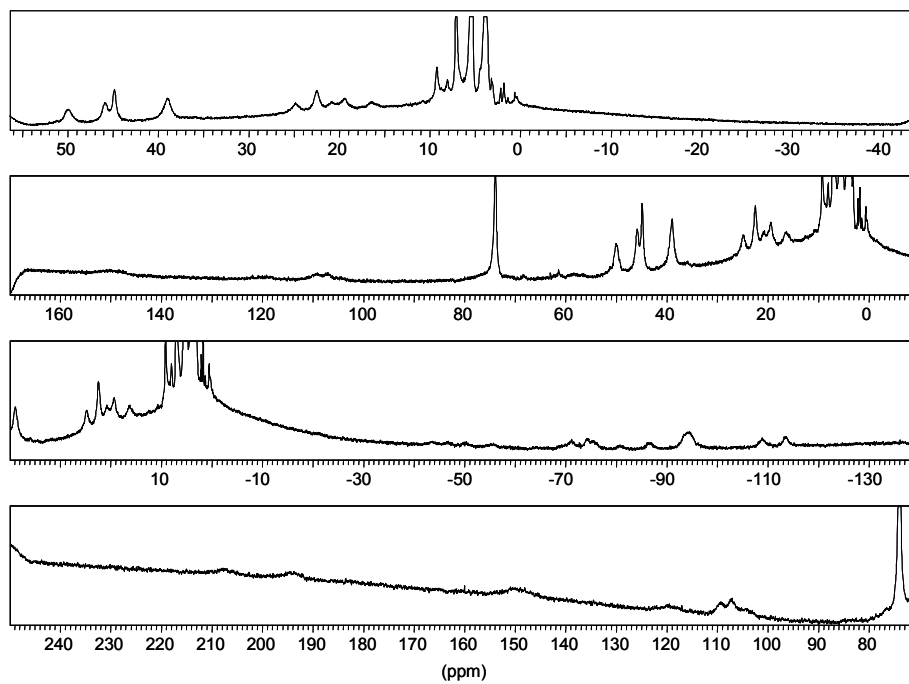
Cidália M. G. dos Santos and Thorfinnur Gunnlaugsson

## Electronic Supporting Information

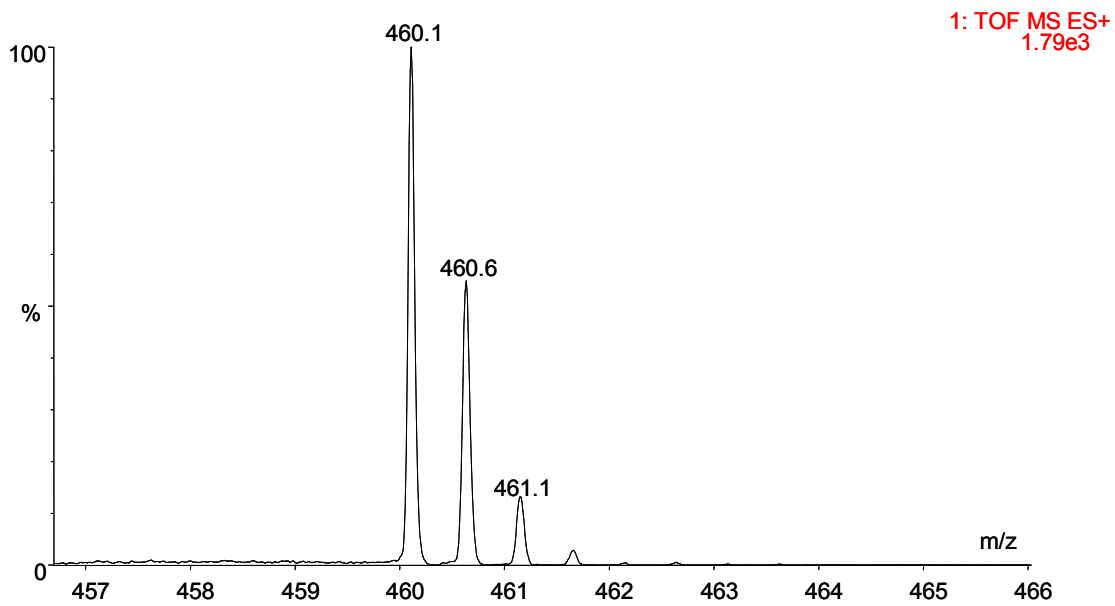
Figure S1  $^1\text{H-NMR}$  (400 MHz,  $\text{CDCl}_3$ ) of ligand 1



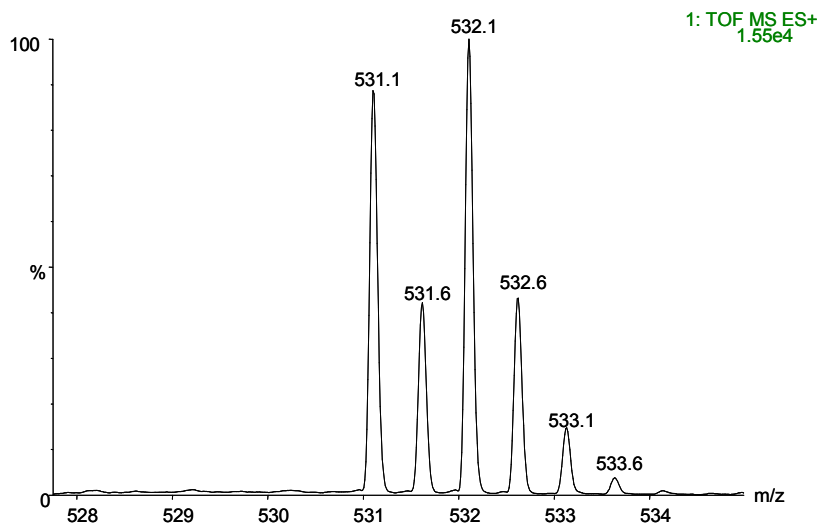
**Figure S2a**  $^1\text{H-NMR}$  (400 MHz,  $\text{CD}_3\text{OD}$ ) of **Tb.1**



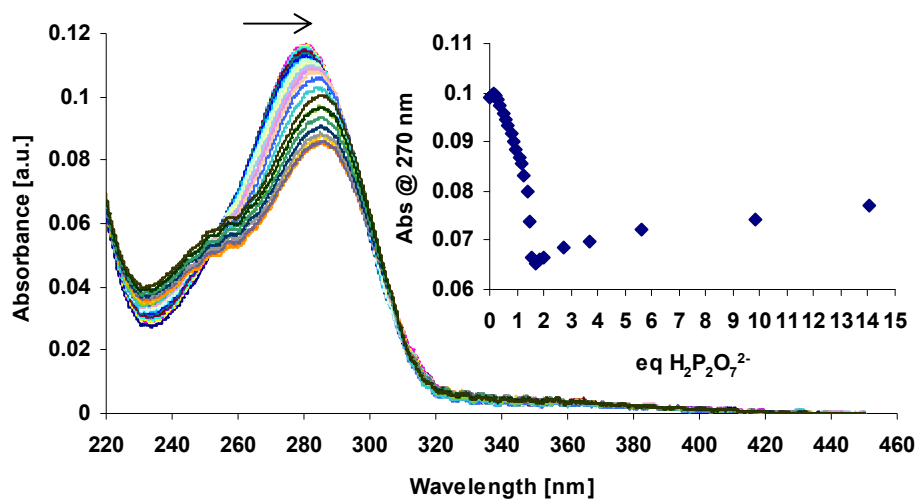
**Figure S2b** ESMS of **Tb.1** showing the Tb(III) characteristic isotopic distribution pattern for the M/2 peak



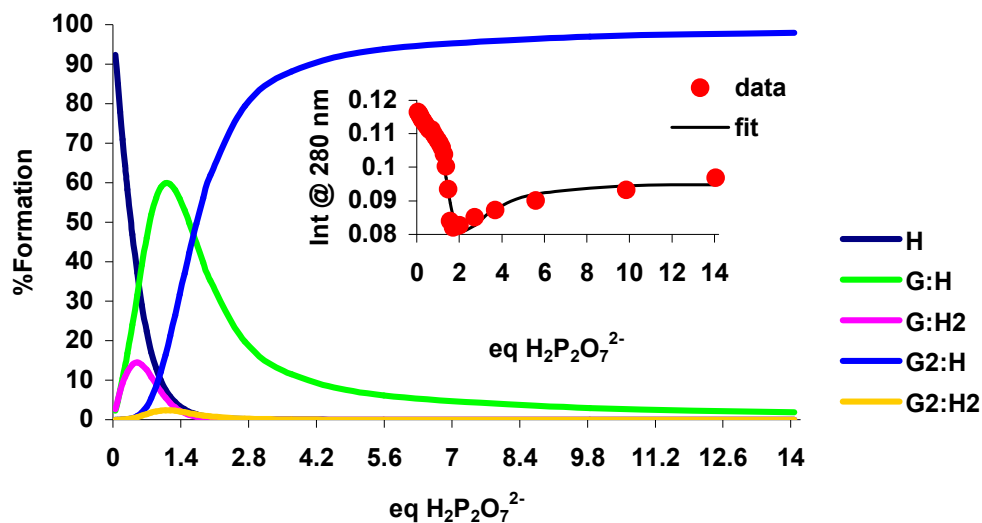
**Figure S2c** ESMS of **Eu.1** showing the Eu(III) characteristic isotopic distribution pattern for the  $[M + CF_3SO_3]/2$  peak



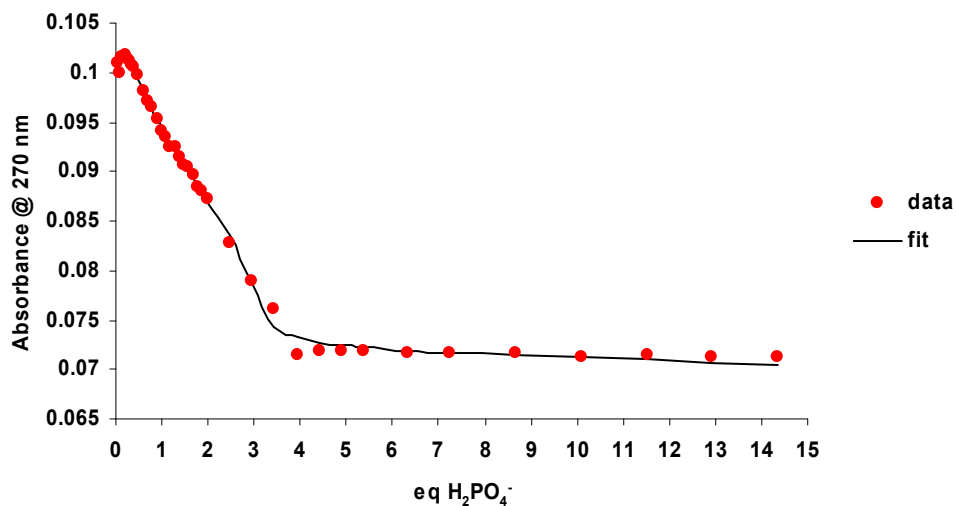
**Figure S3** Changes in the absorption spectra of **Tb.1** ( $4\mu\text{M}$ ) upon gradual additions of  $\text{H}_2\text{P}_2\text{O}_7^{2-}$  ( $0 \rightarrow 56.3\ \mu\text{M}$ ) in  $\text{CH}_3\text{CN}$ . Insert shows the titration profile for the changes at 270 nm versus the equivalents of  $\text{H}_2\text{P}_2\text{O}_7^{2-}$ .



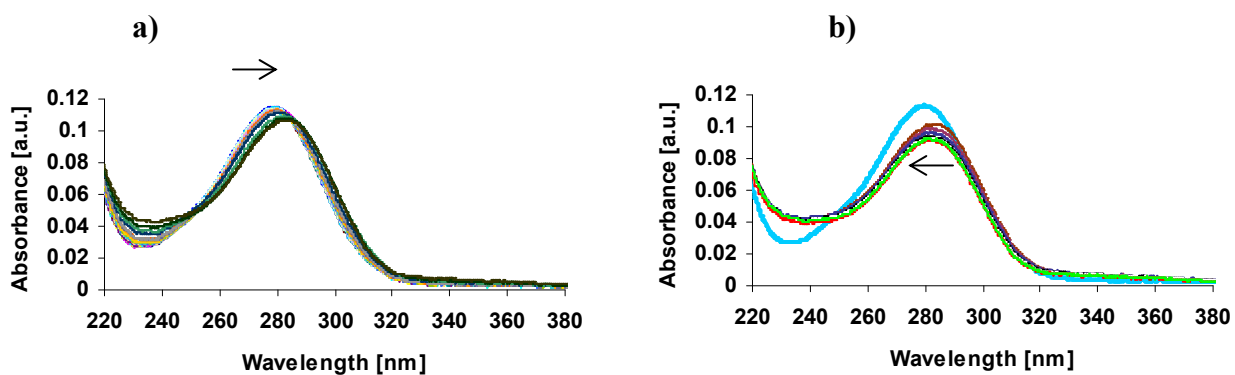
**Figure S4** Speciation distribution diagram obtained for the absorption titration of **Tb.1** (H) with  $\text{H}_2\text{P}_2\text{O}_7^{2-}$  (G). Insert: The experimental binding isotherm and corresponding fit obtained using SPECFIT.



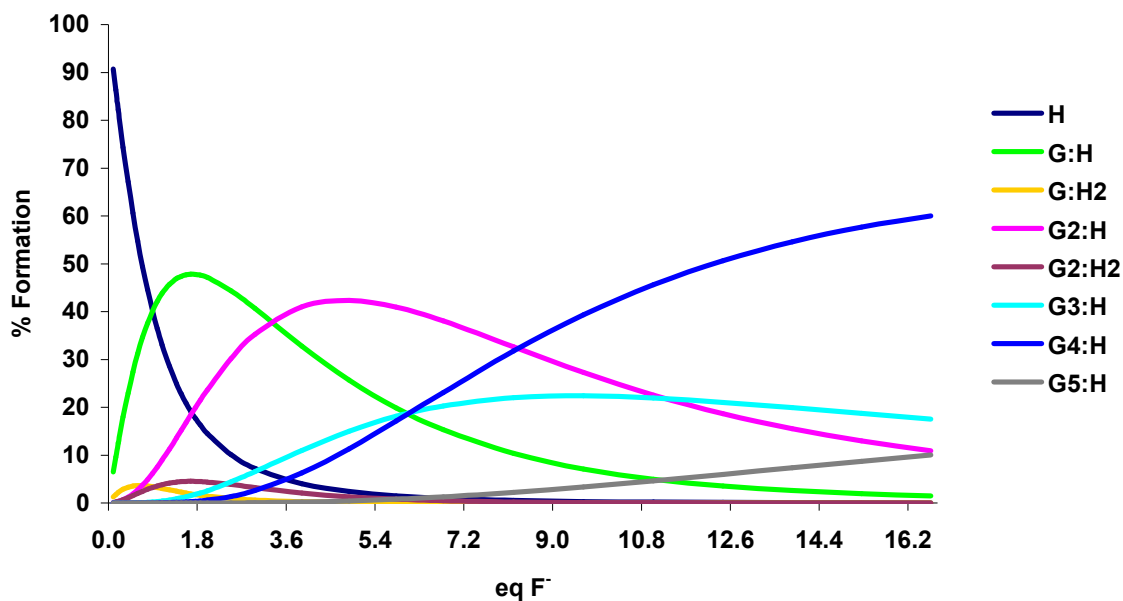
**Figure S5** Experimental binding isotherm for the absorption titration of **Tb.1** ( $4\mu\text{M}$ ) with  $\text{H}_2\text{PO}_4^-$  and corresponding fit obtained using SPECFIT.



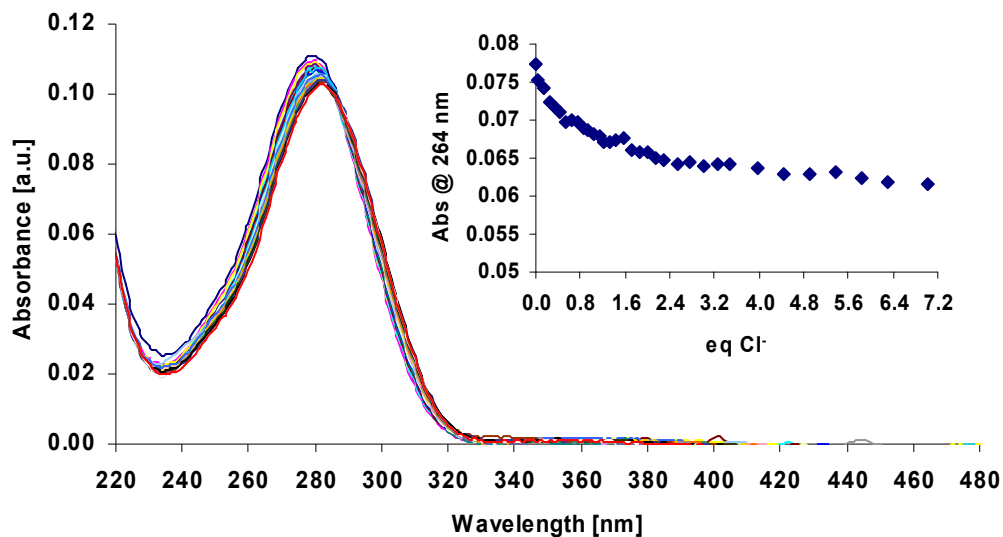
**Figure S6** Absorption spectra showing the changes in the absorbance of **Tb.1** ( $4\mu\text{M}$ ) upon gradual additions of: **a)**  $0 \rightarrow 7$  equivalents of  $\text{F}^-$ ; **b)**  $8 \rightarrow 17$  equivalents of  $\text{F}^-$ , light blue line represents free **Tb.1**



**Figure S7** Speciation distribution diagram obtained for the absorption titration of **Tb.1** (H) with  $\text{F}^-$  (G).



**Figure S8** Absorption spectra showing the changes in the absorbance of **Tb.1** ( $4\mu\text{M}$ ) upon gradual additions of  $\text{Cl}^-$  ( $0 \rightarrow 28.1\ \mu\text{M}$ ) in  $\text{CH}_3\text{CN}$ . Insert: The titration profile for the changes at 264 nm versus the equivalents of  $\text{Cl}^-$



**Figure S9** Changes in the fluorescence spectra of **Tb.1** ( $4\mu\text{M}$ ) upon gradual additions of  $\text{H}_2\text{PO}_4^-$  ( $0 \rightarrow 57.3\ \mu\text{M}$ ) in  $\text{CH}_3\text{CN}$ . Insert: The titration profile for the changes at 422 nm versus the equivalents of  $\text{H}_2\text{PO}_4^-$

