**Supplementary Data**

Cation Complexation with \( p\text{-}\text{tert-}\text{butylcalix}[5]\text{arene} \) Pentacarboxylic Acid Derivative: An Allosteric Regulation of The First Metal Ion For Stepwise Extraction of The Second Ion

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**Fig SF1** \( ^1\text{H NMR} \) spectrum of Na complexed 2 in CDCl\(_3\) (solvent peak at 7.26 ppm)

![NMR spectrum](image)

Supplementary information
Fig SF2 $^1$H-NMR spectrum of Na free 2 in CDCl$_3$
Fig SF3 $^1$H-NMR spectrum of 3 in CDCl$_3$

Supplementary information
**Fig. SF4** Typical Job’s plot for extraction of (a) Zn(II), (b) Co(II) and (c) Ni(II) with 3.
**Fig. SF5** Nitrate dependency test for the extraction of lead ion with 3. [3]= 2.0 mM, [Pb^{2+}]= 0.1 mM, adjustment of [NO_3^-]= 1.0 M LiNO_3 in 0.05 M HNO_3, phase ratio = 1, shaking time = 8.0 h at 303 K.
Fig. SF6 Effect of added lead on percentage shift (Δ) of aryl peak with corresponding percentage loading (♦) of metal ion on 3.
**Fig SF7** IR spectra (KBr) of 3, 3•Cu$^{2+}$ and 3•(Pb$^{2+}$)$_2$ complexes
**Fig SF8** FT-IR spectrum (KBr) of $3\cdot Pb^{2+}$ complex
**Fig. SF9** Effect of acid concentration on percentage stripping of loaded Pb(II). 

\[ [\text{Pb(II)}]_{\text{loaded}} = 0.1 \text{ mM}, \ [3]=2.0 \text{ mM}, \ \text{phase ratio} = 1, \ \text{shaking time} = 8 \text{ h at 303 K}, \ \ [\text{Pb}]_{\text{loaded}} = 0.1 \text{ mM}. \]