

Supporting Information

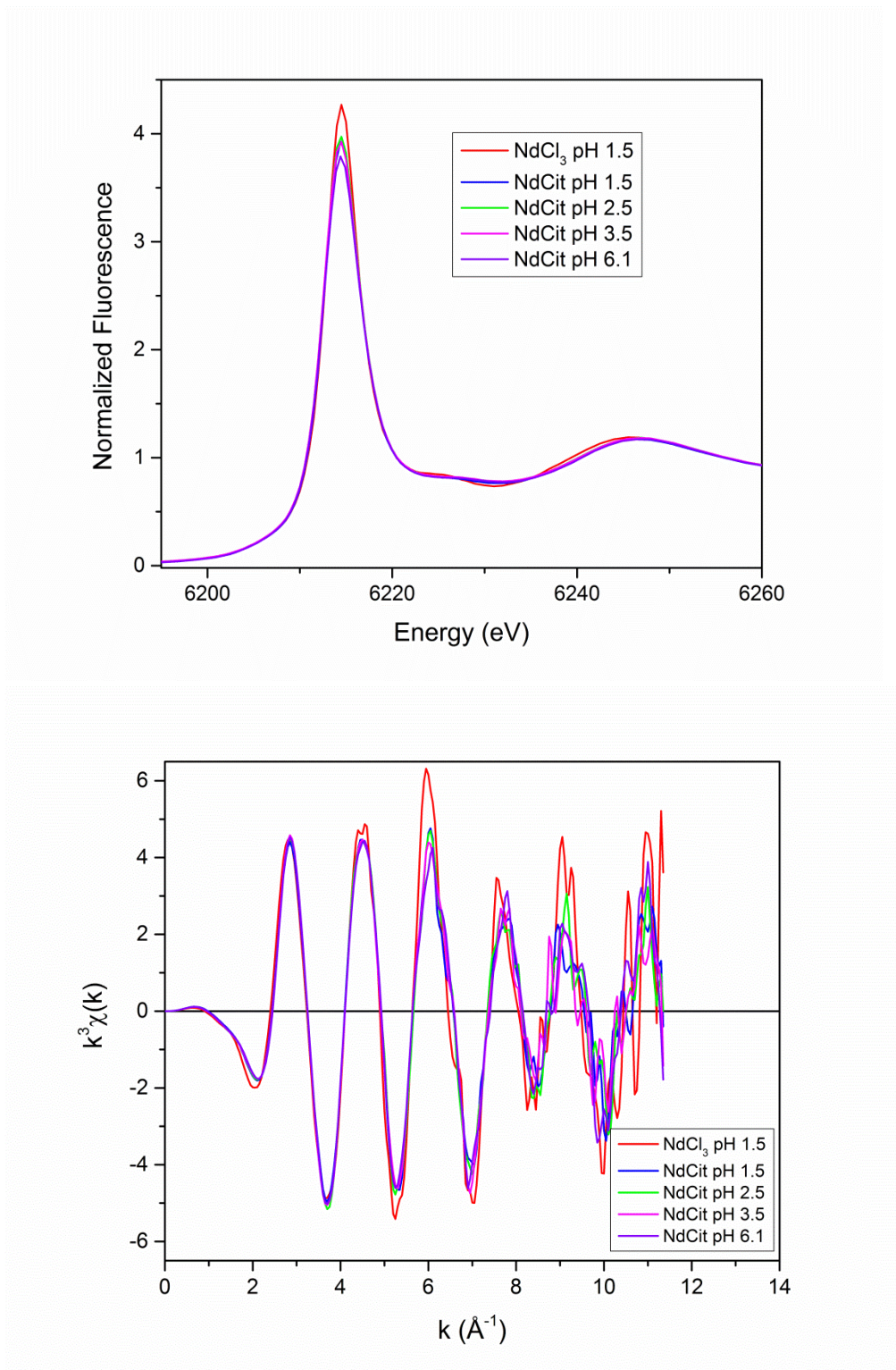


Fig. S1 – Nd L₃ edge fluorescence spectra (top) and $\chi(k)$ (bottom) for a NdCl₃ solution and Nd(III)-Citrate (pH 1.5 - 6.1).

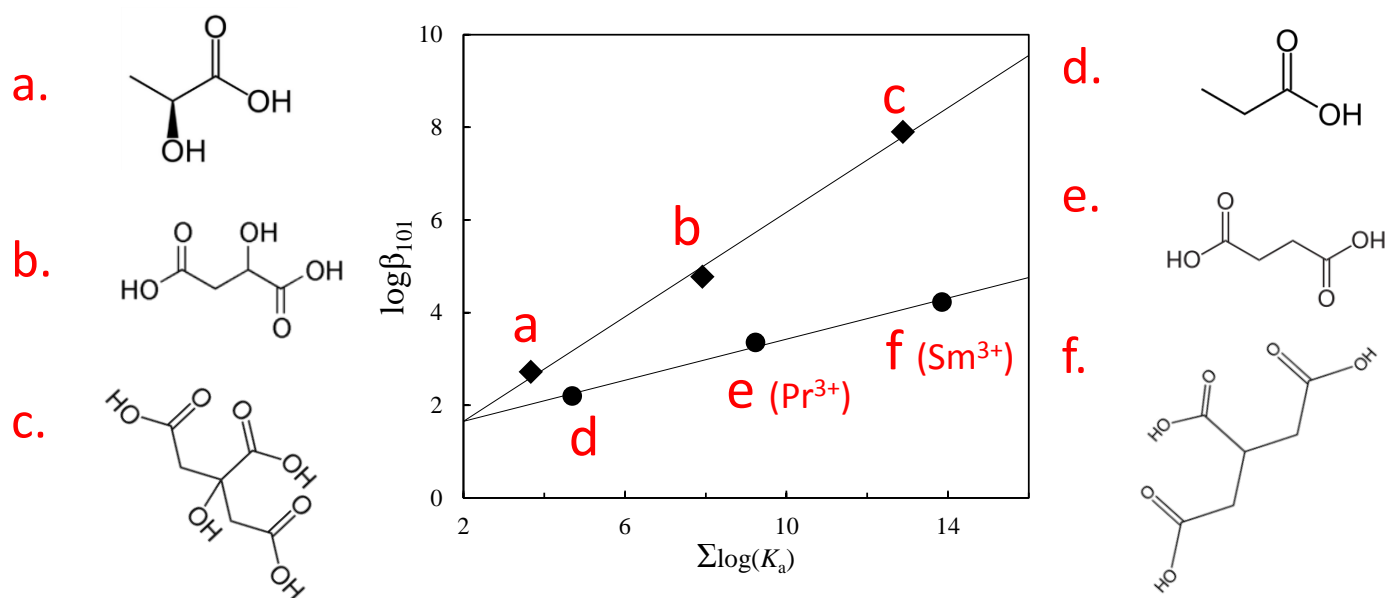


Fig. S2 Stability constants for the selected ligands and lanthanides; $I = 0.1\text{M Na}^+$; 25°C ; constants for Nd^{3+} unless otherwise noted; taken from NIST database. The chemical structures are **a.** lactic acid, **b.** malic acid, **c.** citric acid, **d.** propanoic acid, **e.** succinic acid, **f.** tricarballic acid

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mmol Nd	0.04855			
mmol Cit	0.1931			
mmol H	0.5793			
V0	1.25 mL			
Titrant	Na3Cit			
[Titrant]	0.1665			
Temp	25.0 C			
Pathlength	1 cm			
Titrant (mL)	570 nm	575 nm	580 nm	585 nm
0.08	4.08E-02	1.06E-01	2.03E-01	8.80E-02
0.16	3.78E-02	1.09E-01	2.13E-01	9.69E-02
0.24	3.51E-02	1.11E-01	2.24E-01	1.08E-01
0.32	3.26E-02	1.13E-01	2.31E-01	1.17E-01
0.4	3.03E-02	1.16E-01	2.34E-01	1.24E-01
0.48	2.83E-02	1.18E-01	2.34E-01	1.29E-01
0.56	2.66E-02	1.21E-01	2.32E-01	1.31E-01
0.64	2.50E-02	1.24E-01	2.28E-01	1.32E-01
0.72	2.37E-02	1.27E-01	2.23E-01	1.31E-01
0.8	2.26E-02	1.31E-01	2.18E-01	1.30E-01
0.88	2.17E-02	1.34E-01	2.13E-01	1.29E-01
0.96	2.06E-02	1.39E-01	2.08E-01	1.26E-01
1.04	1.96E-02	1.43E-01	2.03E-01	1.24E-01
1.12	1.87E-02	1.48E-01	1.98E-01	1.22E-01
1.2	1.79E-02	1.53E-01	1.94E-01	1.20E-01
1.28	1.73E-02	1.58E-01	1.90E-01	1.17E-01
1.36	1.67E-02	1.64E-01	1.86E-01	1.15E-01
1.44	1.62E-02	1.71E-01	1.82E-01	1.13E-01
1.52	1.57E-02	1.78E-01	1.78E-01	1.11E-01
1.6	1.53E-02	1.87E-01	1.75E-01	1.09E-01
1.68	1.48E-02	1.96E-01	1.72E-01	1.07E-01
1.76	1.45E-02	2.08E-01	1.68E-01	1.05E-01
1.84	1.42E-02	2.20E-01	1.65E-01	1.03E-01
1.92	1.36E-02	2.34E-01	1.62E-01	1.01E-01

Fig S3: Experimental data for the spectrophotometric titration in Figure 2 with absorbances at selected wavelengths. The refinement parameters employed wavelengths between 550 – 620 at 0.1 nm increments.

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mmol Nd 1.072
 mmol Cit 4.400
 mmol H 13.200
 mmol NO₃ 3.216
 V₀ 80 mL
 Titrant NaOH
 [Titrant] 0.2088
 Temp 25.0 C
 E₀ 414.4 ± 0.4
 slope 1.005

Titrant (mL)	p[H]	Titrant (mL)	p[H]	Titrant (mL)	p[H]	Titrant (mL)	p[H]	Titrant (mL)	p[H]	Titrant (mL)	p[H]
0	1.798	7.5	2.1092	15	2.449	22.5	2.8005	30	3.1806	37.5	3.5978
0.3	1.8064	7.8	2.1227	15.3	2.4624	22.8	2.8156	30.3	3.1991	37.8	3.6146
0.6	1.8165	8.1	2.1361	15.6	2.4759	23.1	2.8291	30.6	3.2143	38.1	3.6331
0.9	1.8283	8.4	2.1496	15.9	2.4893	23.4	2.8425	30.9	3.2294	38.4	3.6499
1.2	1.8418	8.7	2.163	16.2	2.5028	23.7	2.8577	31.2	3.2462	38.7	3.6667
1.5	1.8535	9	2.1765	16.5	2.5162	24	2.8728	31.5	3.263	39	3.6852
1.8	1.8653	9.3	2.1899	16.8	2.5297	24.3	2.888	31.8	3.2782	39.3	3.702
2.1	1.8771	9.6	2.2034	17.1	2.5448	24.6	2.9031	32.1	3.295	39.6	3.7189
2.4	1.8889	9.9	2.2169	17.4	2.5583	24.9	2.9182	32.4	3.3118	39.9	3.7374
2.7	1.9023	10.2	2.232	17.7	2.5717	25.2	2.9317	32.7	3.3286	40.2	3.7559
3	1.9141	10.5	2.2438	18	2.5869	25.5	2.9468	33	3.3455	40.5	3.7744
3.3	1.9276	10.8	2.2572	18.3	2.6003	25.8	2.962	33.3	3.3623	40.8	3.7895
3.6	1.9393	11.1	2.2707	18.6	2.6138	26.1	2.9771	33.6	3.3774	41.1	3.808
3.9	1.9511	11.4	2.2841	18.9	2.6273	26.4	2.9939	33.9	3.3942	41.4	3.8265
4.2	1.9646	11.7	2.2976	19.2	2.6424	26.7	3.0091	34.2	3.4111	41.7	3.8433
4.5	1.978	12	2.311	19.5	2.6558	27	3.0242	34.5	3.4279	42	3.8601
4.8	1.9915	12.3	2.3245	19.8	2.671	27.3	3.0393	34.8	3.4447	42.3	3.8786
5.1	2.0032	12.6	2.3396	20.1	2.6861	27.6	3.0545	35.1	3.4615	42.6	3.8972
5.4	2.0167	12.9	2.3514	20.4	2.6996	27.9	3.0696	35.4	3.4783	42.9	3.9157
5.7	2.0302	13.2	2.3665	20.7	2.713	28.2	3.0848	35.7	3.4952	43.2	3.9342
6	2.0436	13.5	2.3783	21	2.7282	28.5	3.1016	36	3.512	43.5	3.951
6.3	2.0571	13.8	2.3935	21.3	2.7416	28.8	3.1167	36.3	3.5288	43.8	3.9695
6.6	2.0688	14.1	2.4069	21.6	2.7568	29.1	3.1335	36.6	3.5456	44.1	3.988
6.9	2.0823	14.4	2.4204	21.9	2.7719	29.4	3.1487	36.9	3.5641	44.4	4.0065
7.2	2.0957	14.7	2.4338	22.2	2.7854	29.7	3.1655	37.2	3.5793	44.7	4.025

Fig S4: Experimental data for the potentiometric titration in Figure 1.