

Supplementary Information

On-line Green Solid Phase Extraction of Trace Rare Earth Elements and Uranium in Environmental Samples and ICP OES Detection

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Table S1. Selected wavelengths for REES and uranium

Element	Wavelength / nm
Ce	446.021
Dy	353.171
Er	349.910
Eu	420.504
Gd	342.246
Ho	345.600
La	408.671
Lu	261.541
Nd	401.224
Pr	417.939
Sm	359.259
Tb	367.636
Tm	313.125
U	385.959
Y	371.029
Yb	369.419

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Table S2. The Box-Behnken design (BBD) for independent variables

Std	Run	Factor 1 A:Rf	Factor 2 B:neb	Factor 3 C:VH	Factor 4 D:rate	R1(La)	R2(Nd)	R4(Yb)	Mean
11	1	1	0.8	12	50	25.5	6.0	36.2	0.9
17	2	1	0.8	9	32.5	21.2	5.1	29.6	0.7
6	3	1.25	0.8	15	15	9.3	1.9	36.6	0.4
24	4	1.25	1	12	50	8.5	3.6	27.2	0.5
25	5	1.25	0.8	12	32.5	11.6	2.4	27.6	0.5
15	6	1.25	0.6	15	32.5	3.4	0.6	18.9	0.2
4	7	1.5	1	12	32.5	7.4	1.9	24.2	0.3
9	8	1	0.8	12	15	17.7	3.8	30.6	0.6
1	9	1	0.6	12	32.5	6.8	1.2	23.1	0.3
8	10	1.25	0.8	15	50	14.6	3.0	47.6	0.6
3	11	1	1	12	32.5	8.5	4.8	25.1	0.5
28	12	1.25	0.8	12	32.5	12.3	2.5	32.7	0.5
16	13	1.25	1	15	32.5	18.3	5.3	46.4	0.8
27	14	1.25	0.8	12	32.5	11.6	2.4	26.8	0.4
2	15	1.5	0.6	12	32.5	1.8	0.3	12.4	0.1
18	16	1.5	0.8	9	32.5	5.2	1.0	22.4	0.2
12	17	1.5	0.8	12	50	6.5	1.2	25.4	0.3
29	18	1.25	0.8	12	32.5	11.8	2.4	30.3	0.5
10	19	1.5	0.8	12	15	4.5	0.8	21.5	0.2
22	20	1.25	1	12	15	10.1	2.7	23.6	0.4
20	21	1.5	0.8	15	32.5	6.9	1.3	36.3	0.3
19	22	1	0.8	15	32.5	26.9	6.4	39.4	0.9
7	23	1.25	0.8	9	50	10.5	2.2	26.7	0.4
14	24	1.25	1	9	32.5	2.2	1.3	16.3	0.2
5	25	1.25	0.8	9	15	7.2	1.4	25.8	0.3
26	26	1.25	0.8	12	32.5	11.8	2.4	30.4	0.5
13	27	1.25	0.6	9	32.5	3.1	0.5	16.9	0.1
23	28	1.25	0.6	12	50	3.3	0.6	17.0	0.2
21	29	1.25	0.6	12	15	2.3	0.4	14.6	0.1

Rf: radio frequency of ICP OES; neb: nebulizer gas flow rate; rate: sample uptake rate and VH: viewing height.