

Table S1. CCD for four independent variables involved in adsorption step with the respectively observed responses.

Run	Factors				Extraction (%)					
	A	B	C	D	Pb ²⁺	Cd ²⁺	Co ²⁺	Cu ²⁺	Cr ³⁺	Ni ²⁺
1	0.125	0.032	2.13	7	89	75	77	72	73	58
2	0.100	0.024	1.75	6	98	91	56	60	75	98
3	0.125	0.016	1.38	5	88	79	58	70	96	84
4	0.075	0.032	1.38	7	83	76	36	45	55	61
5	0.100	0.024	1.75	6	99	90	56	61	76	88
6	0.100	0.024	1.75	8	80	53	27	30	45	49
7	0.100	0.024	2.50	6	82	80	42	46	62	70
8	0.075	0.032	2.13	5	79	68	22	49	57	59
9	0.100	0.040	1.75	6	94	89	69	84	77	89
10	0.075	0.016	2.13	5	73	61	14	20	50	91
11	0.125	0.016	2.13	7	82	69	47	43	68	53
12	0.125	0.032	1.38	5	95	82	85	99	97	89
13	0.075	0.016	1.38	7	78	64	13	15	55	50
14	0.100	0.024	1.75	4	80	62	29	53	67	75
15	0.100	0.008	1.75	6	78	75	25	29	73	80
16	0.100	0.024	1.75	6	98	91	57	60	57	79
17	0.125	0.016	2.13	5	80	72	52	55	83	77
18	0.150	0.024	1.75	6	87	74	93	86	99	69
19	0.100	0.024	1.75	6	99	92	56	60	74	89
20	0.075	0.016	2.13	7	75	55	9	12	36	32
21	0.125	0.032	1.38	7	93	79	90	83	85	92
22	0.075	0.032	2.13	7	80	68	27	39	42	36
23	0.100	0.024	1.00	6	95	94	60	65	85	98
24	0.100	0.024	1.75	6	99	91	57	61	75	89
25	0.125	0.016	1.38	7	89	71	55	54	88	72
26	0.075	0.016	1.38	5	80	78	20	30	62	70
27	0.125	0.032	2.13	5	89	75	72	82	89	70
28	0.050	0.024	1.75	6	68	57	2	17	40	42
29	0.075	0.032	1.38	5	85	83	35	60	66	74
30	0.100	0.024	1.75	5	99	92	56	60	75	88

Table S2. CCD for three independent variables involved in desorption step with the respectively observed responses.

Run	Factors			% Recovery					
	A	B	C	Pb ²⁺	Cd ²⁺	Co ²⁺	Cu ²⁺	Cr ³⁺	Ni ²⁺
1	4.49	6.00	1.45	74	73	59	88	56	64
2	7.00	3.49	1.45	92	90	75	45	75	72
3	4.49	3.49	1.45	71	70.5	61	45	40	41
4	5.98	4.98	0.90	99	99	94	93	99	97
5	5.98	2.00	0.90	82	80	71	39	60	60
6	4.49	3.49	0.53	85	89	84	70	57	60
7	4.49	3.49	2.38	55	53	30	27	17	20
8	3.00	2.00	0.90	55	51	43	24	4	14
9	3.00	2.00	2.00	40	30	20	5	3	8
10	4.49	3.49	1.45	72	72	60	46	41	40
11	1.98	3.49	1.45	49	47	30	26	7	7
12	4.49	3.49	1.45	72	70	61	44	39	39
13	4.49	3.49	1.45	72	71	61	45	40	41
14	3.00	4.98	2.00	51	50	27	45	20	25
15	4.49	0.98	1.45	50	44	35	10	10	15
16	3.00	4.98	0.90	72	72	64	76	37	38
17	5.98	2.00	2.00	63	60	40	13	24	20
18	4.49	3.49	1.45	71	70	60	45	41	40
19	4.49	3.49	1.45	72	71	60	45	40	40
20	5.98	4.98	2.00	78	76	53	59	51	63