Supplementary Information

Using surface-active ionic liquid-assisted cloud point extraction for pre-concentration and determination of cobalt ions in pharmaceutical preparations

Appendix 1. Matrix of experiments of the Box-Behnken design (BBD) applied to the optimization of effective factors influencing the efficiency of the proposed SAIL-assisted CPE method

Run	pH	SAIL (mM)	APDC*	Triton X-114†	NaCl (%)	Absorbance (657 nm)
1	2.5	0.1	0.05	0.9	0.75	0.06230
2	9.5	0.1	0.05	0.9	0.75	0.05560
3	2.5	0.5	0.05	0.9	0.75	0.05712
4	9.5	0.5	0.05	0.9	0.75	0.04682
5	6	0.3	0.03	0.8	0.75	0.11347
6	6	0.3	0.07	0.8	0.75	0.14230
7	6	0.3	0.03	1.0	0.75	0.15652
8	6	0.3	0.07	1.0	0.75	0.18524
9	6	0.1	0.05	0.9	0.55	0.09674
10	6	0.5	0.05	0.9	0.55	0.08552
11	6	0.1	0.05	0.9	0.95	0.10657
12	6	0.5	0.05	0.9	0.95	0.09547
13	2.5	0.3	0.03	0.9	0.75	0.08456
14	9.5	0.3	0.03	0.9	0.75	0.07451
15	2.5	0.3	0.07	0.9	0.75	0.11036
16	9.5	0.3	0.07	0.9	0.75	0.10680
17	6	0.3	0.05	0.8	0.55	0.10485
18	6	0.3	0.05	1.0	0.55	0.14234
19	6	0.3	0.05	0.8	0.95	0.11247
20	6	0.3	0.05	1.0	0.95	0.15362
21	6	0.1	0.03	0.9	0.75	0.10475
22	6	0.5	0.03	0.9	0.75	0.09412
23	6	0.1	0.07	0.9	0.75	0.13258
24	6	0.5	0.07	0.9	0.75	0.12685
25	2.5	0.3	0.05	0.8	0.75	0.07323
26	9.5	0.3	0.05	0.8	0.75	0.06685
27	2.5	0.3	0.05	1.0	0.75	0.11483
28	9.5	0.3	0.05	1.0	0.75	0.10863
29	6	0.3	0.03	0.9	0.55	0.11756
30	6	0.3	0.07	0.9	0.55	0.14574
31	6	0.3	0.03	0.9	0.95	0.12573
32	6	0.3	0.07	0.9	0.95	0.15742
33	2.5	0.3	0.05	0.9	0.55	0.07452
34	9.5	0.3	0.05	0.9	0.55	0.06753
35	2.5	0.3	0.05	0.9	0.95	0.08365
36	9.5	0.3	0.05	0.9	0.95	0.07256
37	6	0.1	0.05	0.8	0.75	0.09684
38	6	0.5	0.05	0.8	0.75	0.08632
39	6	0.1	0.05	1.0	0.75	0.13574
40	6	0.5	0.05	1.0	0.75	0.12478
41	6	0.3	0.05	0.9	0.75	0.18149
42	6	0.3	0.05	0.9	0.75	0.18695
43	6	0.3	0.05	0.9	0.75	0.18641
44	6	0.3	0.05	0.9	0.75	0.18324
45	6	0.3	0.05	0.9	0.75	0.18435
46	6	0.3	0.05	0.9	0.75	0.18292

* Volume of 0.02 M APDC solution

† Volume of 0.1% Triton X-114 solution

Appendix 2. Estimated effects and coefficients for the suggested model

Term	Coef	SE Coef	T-Value[a]	P-Value[b]
Constant	0.184227	0.000798	233.60	0.000
pH	-0.003831	0.000483	-7.93	0.000
SAIL	-0.004632	0.000483	-9.59	0.000
APDC	0.014754	0.000483	30.55	0.000
Triton X-114	0.020334	0.000483	42.10	0.000
NaCl	0.004543	0.000483	9.41	0.000
pH*pH	-0.074694	0.000654	-114.20	0.000
SAIL* SAIL	-0.054008	0.000654	-82.56	0.000
APDC * APDC	-0.014809	0.000654	-22.65	0.000
Triton X-114* Triton X-114	-0.019847	0.000654	-30.35	0.000
NaCl*NaCl	-0.034494	0.000654	-52.75	0.000
pH * SAIL	-0.000900	0.000966	-0.93	0.360
pH* APDC	0.001622	0.000966	1.68	0.105
pH* Triton X-114	0.000050	0.000966	0.05	0.959
pH*NaCl	-0.001025	0.000966	-1.06	0.299
SAIL * APDC	0.001225	0.000966	1.27	0.216
SAIL * Triton X-114	-0.000110	0.000966	-0.11	0.910
SAIL*NaCl	0.000030	0.000966	0.03	0.975
APDC * Triton X-114	-0.000028	0.000966	-0.03	0.978
APDC*NaCl	0.000877	0.000966	0.91	0.372
Triton X-114*NaCl	0.000915	0.000966	0.95	0.353

[a] T = Coef/SECoef

[b] Significance level

Appendix 3. Analysis of variance (ANOVA) for the suggested model

Source	Df [a]	Adj SS [b]	Adj MS [c]	F- Value [d]	P- Value [e]
Model 1	10	0.073325	0.007333	2073.59	0.000
Linear	5	0.011007	0.002201	622.55	0.000
pH	1	0.000235	0.000235	66.39	0.000
SAIL	1	0.000343	0.003483	97.10	0.000
APDC	1	0.003483	0.006616	984.99	0.000
Triton X-114	1	0.006616	0.000330	1870.90	0.000
NaCl	1	0.000330	0.012464	93.39	0.000
Square	5	0.062318	0.048691	3524.63	0.000
pH*pH	1	0.048691	0.025456	13769.49	0.000
SAIL * SAIL	1	0.025456	0.001914	7198.88	0.000
APDC*APDC	1	0.001914	0.003438	541.25	0.000
Triton X-114* Triton X-114	1	0.003438	0.010384	972.19	0.000
NaCl*NaCl	1	0.010384	0.000004	0.293652	0.000
Error	35	0.000124	0.000002		
Lack-of-Fit	30	0.000101	0.000003	0.76	0.719 [f]
Pure Error	5	0.000022	0.000004		
Total	45	0.073449			

[a] Degree of freedom

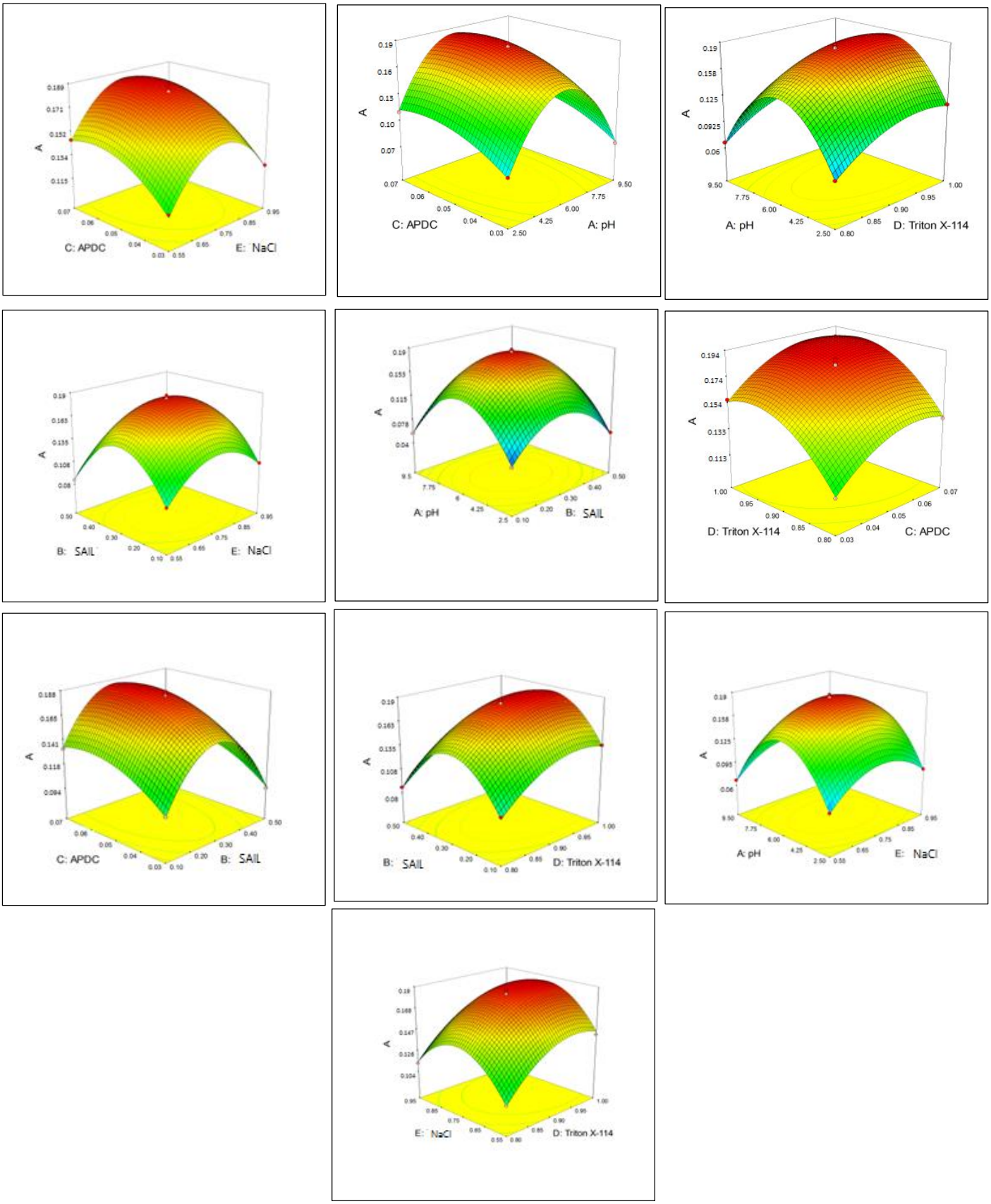
[b] Adjusted sum of squares

[c] Adjusted mean of squares

[d] Fischer ratio

[e] Significance level

[f] Lack of fit: not significant



Appendix 4. Response surfaces obtained from the Box–Behnken design of the proposed SAIL-assisted CPE method