



Supplementary Information

Optimization of Auxiliary Solvent Demulsification Microextraction for Determination of Cyanide in Environmental Water and Biological Samples by Microvolume UV-Vis Spectrophotometry

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Table S1. Design matrix and the absorbance for 2⁸⁻⁴ fractional factorial design

Run	A	B	C	D	E	F	G	H	Absorbance
1	-1	-1	+1	-1	+1	+1	+1	-1	0.153
2	-1	-1	+1	+1	-1	-1	+1	+1	0.124
3	+1	+1	+1	-1	-1	-1	+1	-1	0.129
4	0	0	0	0	0	0	0	0	0.131
5	+1	-1	-1	+1	+1	-1	+1	-1	0.107
6	+1	+1	-1	-1	-1	+1	+1	+1	0.081
7	0	0	0	0	0	0	0	0	0.134
8	-1	-1	-1	-1	-1	-1	-1	-1	0.047
9	+1	+1	+1	+1	+1	+1	+1	+1	0.136
10	-1	+1	-1	+1	-1	+1	+1	-1	0.104
11	0	0	0	0	0	0	0	0	0.133
12	+1	-1	+1	-1	+1	-1	-1	+1	0.092
13	-1	+1	-1	-1	+1	-1	-1	+1	0.089
14	+1	+1	-1	+1	-1	-1	-1	+1	0.074
15	-1	-1	-1	+1	+1	+1	-1	+1	0.078
16	+1	-1	+1	+1	-1	+1	-1	-1	0.163
17	+1	+1	-1	-1	+1	+1	-1	-1	0.109
18	-1	+1	+1	-1	-1	+1	-1	-1	0.074
19	-1	+1	+1	+1	+1	-1	-1	-1	0.127

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Table S2. Analysis of variance (ANOVA) for fractional factorial design (coded units)

Source	Effect	Seq. SS	DF	Adj. MS	F value	P value
Main effects		0.0129065	8	0.00161331	691.42	0.001
A	0.01187	0.0005641	1	0.00056406	241.74	0.004
B	-0.00038	0.0000006	1	0.00000056	0.24	0.672
C	0.03863	0.0059676	1	0.00596756	2557.53	0.000
D	0.01737	0.0012076	1	0.00120756	517.53	0.002
E	0.01188	0.0005641	1	0.00056406	241.74	0.004
F	0.01362	0.0007426	1	0.00074256	318.24	0.003
G	0.01987	0.0015801	1	0.00158006	677.17	0.001
H	-0.02388	0.0022801	1	0.00228006	977.17	0.001
2-Way interactions	0.00163	0.0021774	7	0.00031106	133.31	0.007
A × B	0.00163	0.0000106	1	0.00001056	4.53	0.167
A × C	-0.00137	0.0000076	1	0.00000756	3.24	0.214
A × D	-0.00012	0.0000001	1	0.00000006	0.03	0.885
A × E	-0.01262	0.0006376	1	0.00063756	273.24	0.004
A × F	0.00813	0.0002641	1	0.00026406	113.17	0.009
A × G	-0.01613	0.0010401	1	0.00104006	445.74	0.002
A × H	-0.00738	0.0002176	1	0.00021756	93.24	0.011
Curvature	-	0.0018731	1	0.00187308	802.75	0.001
Residual error	-	0.0000047	2	0.00000233	-	-
Pure error	-	0.0000047	2	0.00000233	-	-
Total	-	0.0169617	18	-	-	-

Table S3. Factors, their levels and symbols for central composite designs

Factors	Symbol	Low (-1)	Central (0)	High (+1)
Volume of extraction solvent / μL	A	50	125	200
Volume of demulsifier solvent / mL	C	0.5	1.25	2
pH	D	6	9	12

Factors: 3; replicates: 1; base runs: 20; total runs: 20; base blocks: 2; total blocks: 2; two-level factorial: full factorial; cube points: 8; center points in cube: 4; axial points: 6; center points in axial: 2; alpha: 1.633.

Table S4. Design matrix and the absorbance for central composite designs

Run	Blocks	A	C	D	Absorbance
1	1	+1	-1	+1	0.104
2	1	+1	-1	-1	0.078
3	1	+1	+1	-1	0.134
4	1	0	0	0	0.145
5	1	0	0	0	0.148
6	1	0	0	0	0.143
7	1	-1	+1	+1	0.181
8	1	+1	+1	+1	0.169
9	1	-1	+1	-1	0.129
10	1	-1	-1	-1	0.066
11	2	-1	-1	+1	0.098
12	2	0	0	0	0.151
13	2	0	0	0	0.145
14	2	+1.633	0	0	0.114
15	2	0	-1.633	0	0.053
16	2	0	0	0	0.149
17	2	-1.633	0	0	0.107
18	2	0	0	+1.633	0.166
19	2	0	+1.633	0	0.169
20	2	0	0	-1.633	0.087

Table S5. Analysis of variance (ANOVA) for central composite designs (coded units)

Source	Seq. SS	DF	Adj. MS	F value	P value
Blocks	0.000124	1	0.000124	4.53	0.062
Regression	0.025189	9	0.002799	102.14	0.000
Linear	0.021293	3	0.007098	259.02	0.000
A	0.000038	1	0.000038	1.38	0.271
C	0.015624	1	0.015624	570.19	0.000
D	0.005631	1	0.005631	205.49	0.000
Square	0.003646	3	0.001215	44.35	0.000
A × A	0.001519	1	0.001852	67.58	0.000
C × C	0.001676	1	0.001794	65.45	0.000
D × D	0.000451	1	0.000451	16.44	0.003
Interaction	0.000249	3	0.000083	3.03	0.086
A × C	0.000078	1	0.000078	2.85	0.126
A × D	0.000066	1	0.000066	2.41	0.155
C × D	0.000105	1	0.000105	3.84	0.082
Residual error	0.000247	9	0.000027	-	-
Lack-of-fit	0.000202	5	0.000040	3.61	0.119
Pure error	0.000045	4	0.000011	-	-
Total	0.025559	19	-	-	-