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SUPPLEMENTARY MATERIAL TO

Optimization of deep eutectic solvent based liquid phase microextraction of PAHs in environmental samples using response surface methodology

NUR HIDAYAH SAZALI[1], MAZIDATULAKMAM MISKAM[2], FAIZ BUKHARI MOHD SUAH[2] and NURUL YANI RAHIM[2]*

[1]*Institute of Sustainable Energy and Resources, Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak, Malaysia, and* [2]*School of Chemical Sciences, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Malaysia*

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Table S-I. Factors, actual and coded levels, and design matrix used in BBD for extraction of PAHs.

Factors	Levels		
	Low (-1)	Central (0)	High (+1)
Amount of MNP (X_1)	5 mg	10 mg	15 mg
Volume of DES 1 (X_2)	25 µL	57.5 µL	90 µL
Addition of salt (X_3)	0 mg	400 mg	800 mg
Extraction time (X_4)	1 min	5.5 min	10 min

Run	X_1	X_2	X_3	X_4	Total Peak Area
1	0	1	1	0	12791.4
2	0	0	1	-1	13475.01
3	0	0	-1	-1	4956.06
4	0	0	0	0	10409.47
5	0	-1	-1	0	4301.17
6	0	0	0	0	7232.75
7	-1	0	0	1	5663.43
8	0	0	0	0	12951.61
9	0	-1	1	0	30499.95
10	1	0	0	-1	17902.92
11	1	0	1	0	21445.59
12	-1	0	-1	0	5608.21
13	-1	0	0	-1	14281.39
14	0	1	-1	0	5938.1
15	0	1	0	-1	18590.96
16	1	-1	0	0	20089.58

* Corresponding author. E-mail: nurulyanirahim@usm.my

17	1	0	0	1	15669.13
18	-1	0	1	0	14115.98
19	-1	-1	0	0	9925.93
20	1	1	0	0	18459.84
21	0	0	1	1	12002.42
22	0	0	-1	1	3519.91
23	1	0	-1	0	6777.07
24	0	1	0	1	11623.2
25	0	-1	0	1	18922.02
26	0	-1	0	-1	18955.6
27	-1	1	0	0	12873.51

Table S-II. ANOVA results obtained by BBD.

Source	Degree of freedom (DF)	Sum of Square (SS)	Mean Square (MS)	F-value	P-value
Model	14	944374587	67455328	6.28	0.001
Linear	4	644230114	161057529	15	0.000
X_1	1	119547261	119547261	11.13	0.006
X_2	1	41877721	41877721	3.9	0.072
X_3	1	446884000	446884000	41.61	0.000
X_4	1	35921132	35921132	3.34	0.092
X_1^2	1	21044575	21044575	1.96	0.187
X_2^2	1	108300369	108300369	10.08	0.008
X_3^2	1	11002371	11002371	1.02	0.331
X_4^2	1	6221976	6221976	0.58	0.461
X_1X_2	1	5237965	5237965	0.49	0.498
X_1X_3	1	9488710	9488710	0.88	0.366
X_1X_4	1	10189407	10189407	0.95	0.349
X_2X_3	1	93561899	93561899	8.71	0.012
X_2X_4	1	12020713	12020713	1.12	0.311
X_3X_4	1	332	332	0	0.996
Lack-of-Fit	10	112457625	11245762	1.37	0.494
Pure Error	2	16419795	8209898		
Total SS		1073252007			
R^2		0.8799			
Adj R^2		0.7398			

Table S-III. Analytical performance of the proposed method

	Linearity ($\mu g\ mL^{-1}$)	slope	y-intercept	R^2	LOD (ng/mL^{-1})	LOQ ($ng\ mL^{-1}$)	EF	Interday **n=5**	Intraday **n=15**
Naphthalene	0.005 – 5	126103	-13702	0.9915	1.70	5.67	32.88	15.85	16.90
Biphenyl	0.005 – 5	140933.2	37004.56	0.9997	1.52	5.08	26.67	15.59	16.05
Acenaphthylene	0.005 – 5	144895.1	61485.88	0.9738	1.48	4.94	29.36	11.98	14.56
Anthracene	0.005 – 5	534834.5	-54043.2	0.9831	0.40	1.33	40.05	9.92	13.06
Pyrene	0.005 – 5	386375.5	-34810	0.9921	0.55	1.85	30.71	9.37	15.21819

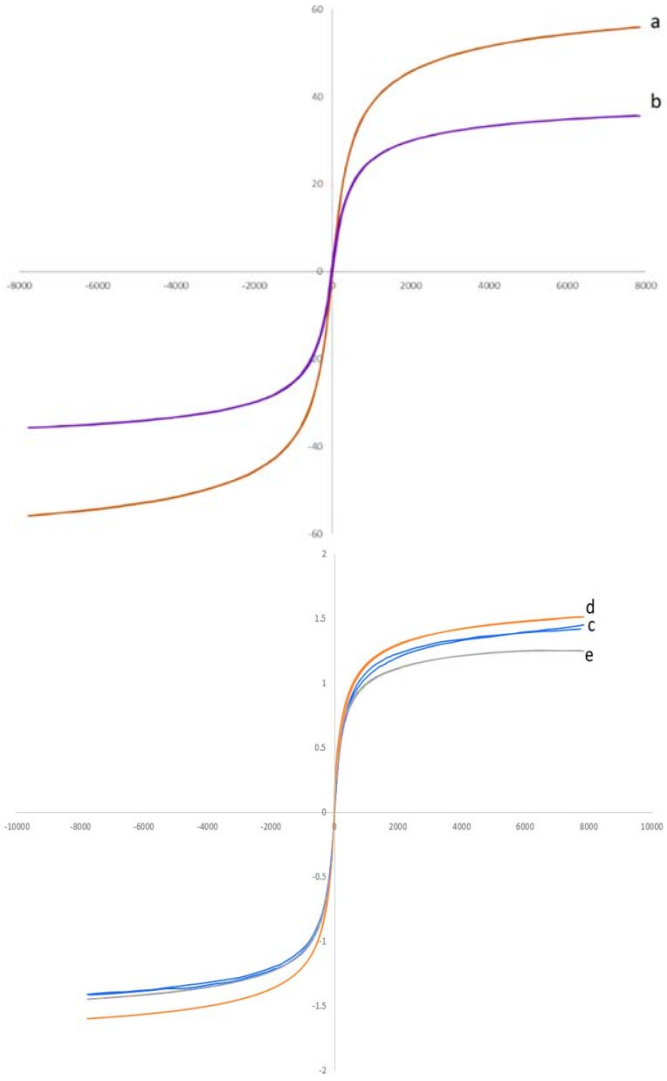

Fig. S-1. Hysteresis loops of (a) MNP, (b) MNPTEOS, (c) MNPDES 1, (d) MNPDES 2, (e) MNPDES 3.

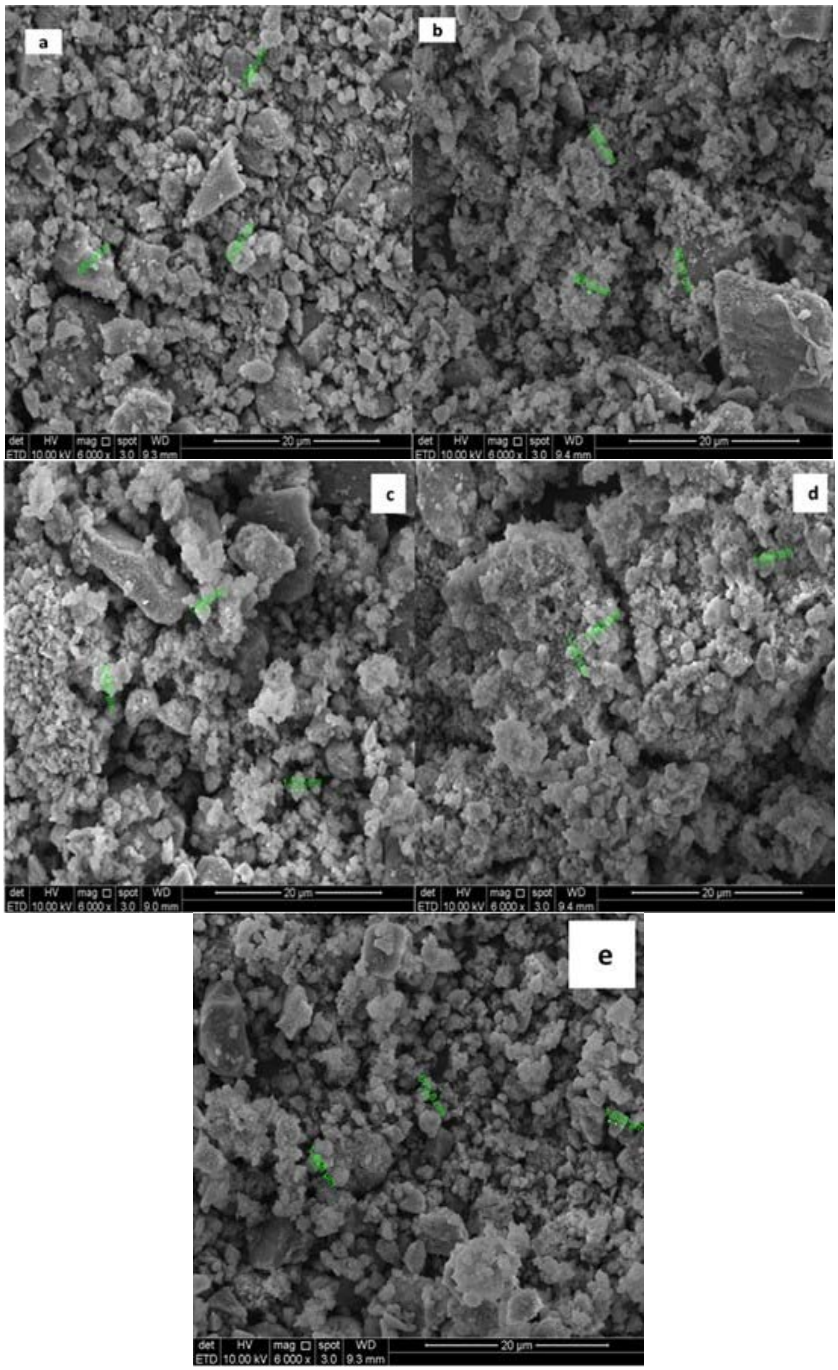

Fig.S-2. SEM images of (a) MNP, (b) MNPTEOS, (c) MNPDES 1, (d) MNPDES 2, (e) MNPDES 3.

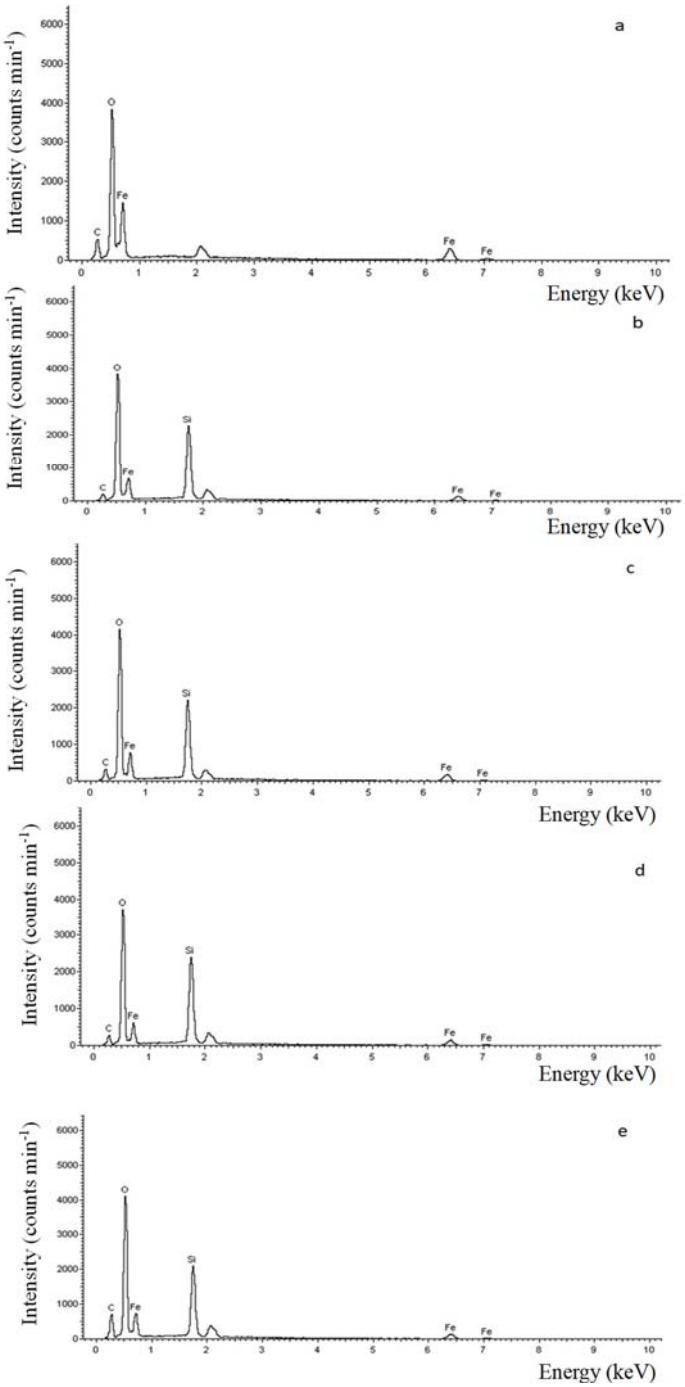

Fig. S-3. EDX images of (a) MNP, (b) MNPTEOS, (c) MNPDES 1, (d) MNPDES 2, (e) MNPDES 3.