## **Electronic Supplementary Information**

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## Facile and environmentally friendly magnetic mesoporous carbon for the selective extraction of antioxidants from water

Thitima Rujiralai,\*<sup>a,b</sup> Sujitra Kaewsara,<sup>c</sup> Laemthong Chuenchom,<sup>a</sup> Panuwat Jitpirom,<sup>b,c</sup> and Sulawan Kaowphong<sup>d</sup>

<sup>a</sup> Department of Chemistry and Center of Excellence for Innovation in Chemistry, Faculty of Science, Prince of Songkla University, Songkhla, 90112, Thailand.

<sup>b</sup> Analytical Chemistry and Environment Research Unit, Division of Chemistry, Department of Science, Faculty of Science and Technology, Prince of Songkla University, Pattani, 94000, Thailand.

<sup>c</sup> Department of Chemistry, Faculty of Science, Prince of Songkla University, Songkhla, 90112, Thailand.

<sup>d</sup> Department of Chemistry and Environmental Science Research Center, Faculty of Science, Chiang Mai University, 50200, Thailand.

\* Corresponding author: Asst. Prof. Dr. Thitima Rujiralai Tel: +66 84 2569514; Email: thitima.r@psu.ac.th (T Rujiralai)



Fig. S1 (a) BET isotherm and (b) BJH pore size distribution of magnetic mesoporous carbon



Fig. S2 The equilibrium adsorption isotherm of BHT and BHA onto MMC at room temperature



Fig. S3 The Langmuir isotherm of BHT and BHA by MMC



Fig. S4 The kinetic of the adsorption of BHT and BHA onto MMC



Fig. S5 Effect of type of desorption solvent. Error bar shows the standard deviation of mean (n = 3)

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Fig. S6 The structures of antioxidants and interfering compounds

Antibiotics such as tetracycline and oxytetracycline are used in confined animal feeding practices for meat, milk and fish production. Dithiocarbamates are applied as fungicides, which zinc diethyldithiocarbamate is also used as an industrial accelerator in natural rubber.  $17\alpha$ -Ethinyl estradiol, a synthetic estrogen hormone, is main ingredient of contraceptive pill.

Table S1 Precision results of determination of BHT and BHA

Precision (%RSD)	BHT	BHA				
Intra-day precision (Analysis on the same day, $n = 10$ )						
at 2.5 µg mL <sup>-1</sup>	2.0	1.7				
at 5.0 µg mL <sup>-1</sup>	0.3	0.3				
Inter-day precision (Analysis for three days with three replicates, $n = 9$ )						
at 2.5 µg mL <sup>-1</sup>	2.8	2.2				
at 5.0 µg mL <sup>-1</sup>	0.1	0.2				

Matrix	Extraction	Detection	LOD		Recovery	RSD	Reference
	method	method	BHT	BHA	(%)	(%)	
Personal care	LLE	HPLC-UV	0.17	0.20	83-109	0.17-0.18	1
products			μg mL-1	μg mL-1			
Food	LLE	HPLC-UV	0.5	0.5	95-108	< 4.0	12
			mg mL <sup>-1</sup>	mg mL <sup>-1</sup>			
Water	SPE (Oasis HLB)	GC-MS	0.2 ng mL <sup>-1</sup>	0.8	84-104	3.0-4.0	8
				ng mL <sup>-1</sup>			
Juice, infant	MSPE	HPLC-UV	6 ng mL <sup>-1</sup>	18.6	84-106	1.9-4.0	17
milk powder	(MZ@CC[4])			ng mL <sup>-1</sup>			
Vegetable oils	DLLME-MSPE	HPLC-DAD	5.8 ng mL <sup>-1</sup>	2.5	95-100	2.6-6.7	18
	(DA@Fe <sub>3</sub> O <sub>4</sub> NPs)			ng mL <sup>-1</sup>			
Water	MSPE (MMC)	HPLC-DAD	0.14	0.22	72-99	0.1-2.8	This work
			μg mL <sup>-1</sup>	$\mu g m L^{-1}$			

**Table S2** Comparison of the proposed method with other existing methods for determination

 of BHT and BHA

LLE: liquid-liquid phase extraction; SPE: solid phase extraction; MSPE: magnetic solid phase extraction; DLLM: dispersive liquid-liquid microextraction; HPLC-UV: high performance liquid chromatographyultraviolet spectrophotometry; GC-MS: gas chromatography-mass spectrometry; DAD: diode array detector; MZ@CC[4]: magnetic zeolite@carboxylatocalix[4]arenes; DA@Fe<sub>3</sub>O<sub>4</sub> NPs: decanoic acid@Fe<sub>3</sub>O<sub>4</sub> magnetic nanoparticles.

## Text S1

For efficient separation of two adjacent peaks in HPLC technique, selectivity ( $\alpha$ ) and peak resolution (*R*) can be considered and are calculated using the equation (2) and (3), respectively.<sup>1</sup>

$$k = \frac{t_R - t_0}{t_0} = \frac{t_R'}{t_0}$$
(1)  

$$\alpha = \frac{t_R'(X)}{t_R'(Y)}$$
(2)  

$$R = \frac{2[t_R(X) - t_R(Y)]}{W_b(X) + W_b(Y)}$$
(3)

where k is the capacitor factor,  $t_R$  is the retention time of the analyte,  $t_0$  is the retention time of the un-retained compound, X and Y are the interested analytes,  $t'_R(X) > t'_R(Y)$  and  $W_b$  is the peak width. When  $\alpha$  is higher than 1.2, the separation is acceptable and a good peak separation is considered for a value of R > 1.<sup>1</sup>

**Table S3** Selectivity ( $\alpha$ ) and peak resolution (*R*) of the separation of zinc diethyldithiocarbamate, 17 $\alpha$ -ethinyl estradiol and BHA

Compound	<i>k</i> *	α	R
Zinc diethyldithiocarbamate	0.23	$\alpha_{\text{ZDEC-BHA}} = 1.83$	$R_{\text{ZDEC-BHA}} = 2.22$
(ZDEC)			
17α-Ethinyl estradiol (EE2)	0.32	$\alpha_{\text{EE2-BHA}} = 1.31$	$R_{\rm EE2-BHA} = 1.25$
ВНА	0.42		

*k* is the capacitor factor

## References

1. S. C. Moldoveanu and V. David, *Essentials in Modern HPLC Separations*, Elsevier, Massachusetts, 2013.