Supplementary Materials

Mixed Matrix Membrane Tip Extraction Coupled With UPLC-MS/MS for the Monitoring of Nonsteroidal Anti-Inflammatory Drugs in Water Samples

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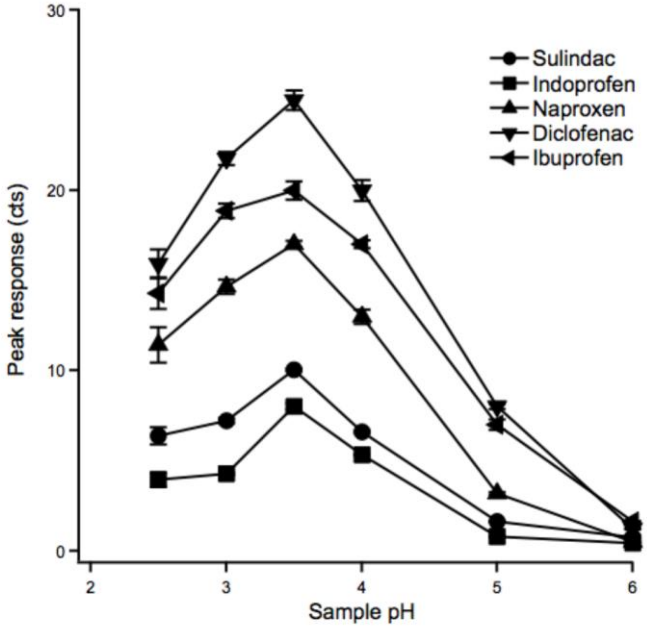

Figure S1. Effect of sample pH on peak responses using mixed matrix membrane tip microextraction. Extraction parameters: addition of salt, 2% (w/v); sample volume, 10 mL; desorption solvent volume, 40 µL; analyte concentration, 100 ng L^{-1} of spiked solution. (Error bars represent standard deviations of results, $n = 3$).

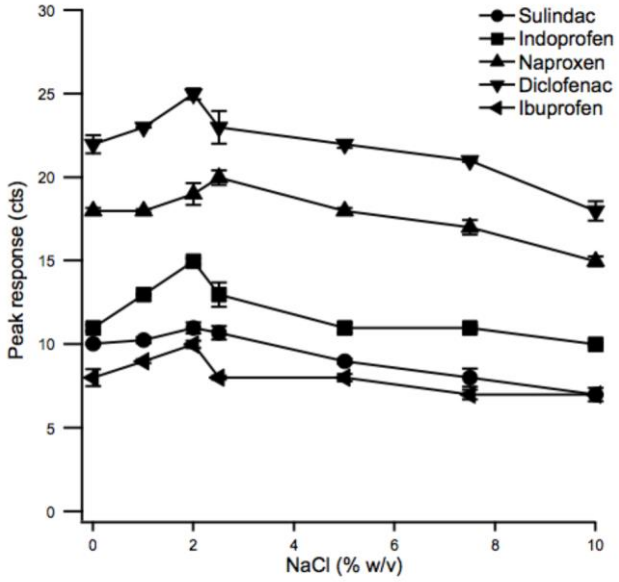

Figure S2. Effect of addition of salt on peak responses using mixed matrix membrane tip microextraction. Extraction parameters: sample pH 3.5; sample volume, 10 mL; desorption solvent volume, 40 µL; analyte concentration, 100 ng L^{-1} of spiked solution. (Error bars represent standard deviations of results, $n = 3$).

Table S1: Comparison of the current work with other previous methods for analysis of NSAIDs.

Materials	Analytical Method	Matrix	Target Analytes	Extraction Time	Desorption Volume (μL)	LODs (ng L^{-1})	EF	Ref.
C_{18}	MPSBSE[a]-HPLC-UV	Wastewater	Ketoprofen and naproxen	60 min	150	7890 and 9520	32.0–49.1	[1]
Magnetic graphene/Fe_3O_4	MSPE[b]- UHPLC-PDA	Human plasma and urine	Furprofen, diclofenac, ketoprofen, flurbiprofen, naproxen and fenbufen and ibuprofen	2 min	500	610 - 1200	-	[2]
MS-CNPrTEOS)[c]	D-μ-SPE[d] -HPLC-UV	Water samples	ketoprofen, ibuprofen, diclofenac and mefenamic acid	5 min	250	210 - 510	42–55	[3]
Sol-gel	FPSE-GC-MS[e]	Water Samples	Ibuprofen naproxen, ketoprofen and diclofenac	120 min	50	0.8 - 5	162–418	[4]
C_{18}	MMM-HPLC-UV[f]	River water	Diclofenac, mefenamic acid and ibuprofen	20 min	100	160 – 220	79–83	Previous work [5]
C_{18}	MMMTE[b]-UPLC-MS/MS[g]	Sewage water	Indoprofen, sulindac, naproxen, diclofenac, and ibuprofen	10 min	40	0.08-0.40	201–249	Current work

[a]Membrane protected stir bar sorptive extraction
[b]Dispersive magnetic solid phase extraction
[c]Magnetic sporopollenin-cyanopropyltriethoxysilane-dispersive
[d]Micro-solid phase extraction
[e]Fabric phase sorptive extraction
[f]MMME – mixed matrix membrane extraction
[g]MMMTE – mixed matrix membrane tip extraction

References:

1. Mao, X.; He, M.; Chen, B.; Hu, B. Membrane protected C_{18} coated stir bar sorptive extraction combined with high performance liquid chromatography-ultraviolet detection for the determination of non-steroidal anti-inflammatory drugs in water samples. *J. Chromatogr. A*, **2016**, *1472*, 27–34.
2. Ferrone, V.; Carlucci, M.; Ettorre, V.; Cotellese, R.; Palumbo, P.; Fontana, A.; Siani, G.; Carlucci, G. Dispersive magnetic solid phase extraction exploiting magnetic graphene nanocomposite coupled with UHPLC-PDA for simultaneous determination of NSAIDs in human plasma and urine. *J. Pharmaceut. Biomed. Anal.*, **2018**, *161*, 280–288.
3. Abd Wahib, S.M.; Wan Ibrahim, W.A.; Sanagi, M.M.; Kamboh, M.A.; Abdul Keyon, A.S. Magnetic sporopollenin-cyanopropyltriethoxysilane-dispersive micro-solid phase extraction coupled with high performance liquid chromatography for the determination of selected non-steroidal anti-inflammatory drugs in water samples. *J. Chromatogr. A*, **2018**, *1532*, 50–57.
4. Racamonde, I.; Rodil, R.; Quintana, J.B.; Sieira, B.J.; Kabir, A.; Furton, K.G.; Cela, R. Fabric phase sorptive extraction: A new sorptive microextraction technique for the determination of non-steroidal anti-inflammatory drugs from environmental water samples. *Anal. Chim. Acta*, **2015**, *865*, 22–30.
5. Kamaruzaman, S.; Hauser, P.C.; Sanagi, M.M.; Ibrahim, W.A.W.; Endud, S. and See, H.H. A simple microextraction and preconcentration approach based on a mixed matrix membrane. *Anal. Chim. Acta*, **2013**, *783*, 24–30.