Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

Clayey-sand filter for the pharmaceuticals removal from wastewater effluent: Percolation experiments

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Supplementary Information

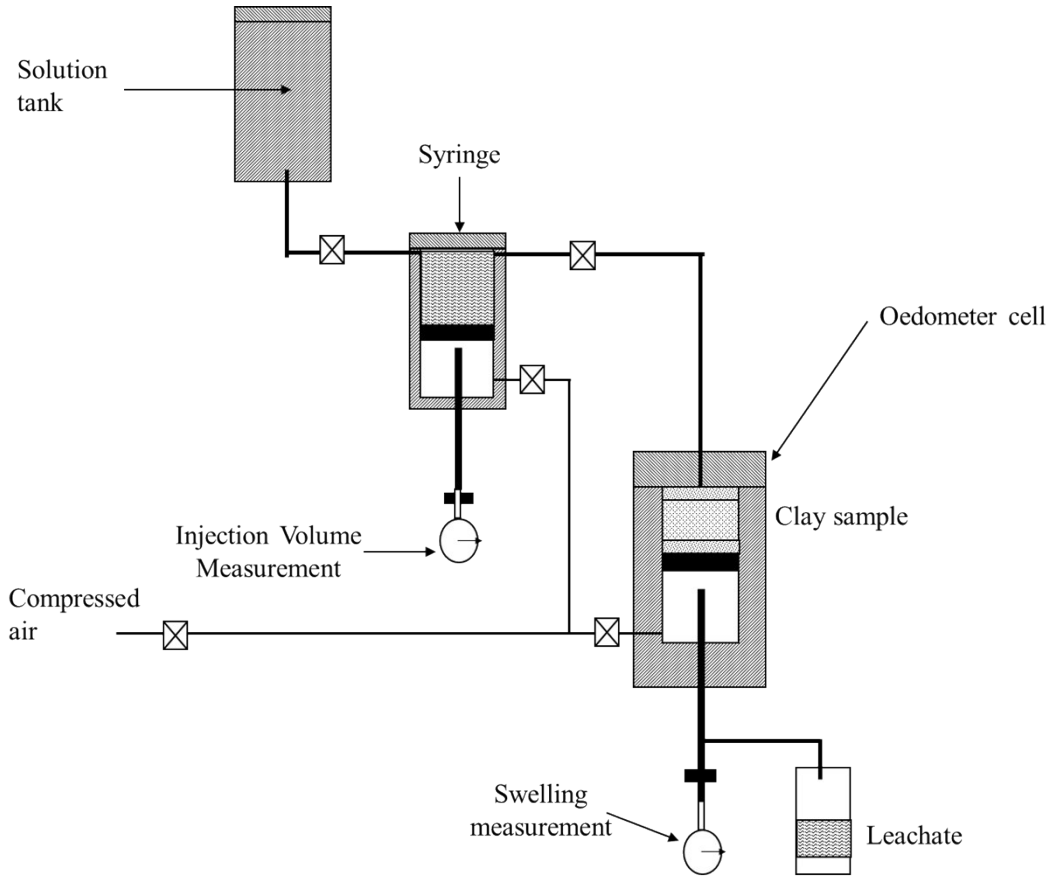

Figure S1 : Experimental equipment, adapted from *Jullien et al., 2002*

Table S1 : Concentration of the investigated pharmaceuticals in the used effluents (n=3) with the average effluent concentration in $ng.L^{-1}$ and RSD the Relative Standard Deviation and b.l.d. below detection limit

Pharmaceutical	Average Effluent Concentration	Relative Standard Deviation
Ibuprofen	63,51	1,22
Tramadol	39,71	0,31
Gemfibrozil	33,80	0,26
Doxepin	62,65	0,08
Metoprolol	b.l.d.	
Naproxen	57,43	0,29
Ketoprofen	87,84	0,21
Diazepam	b.l.d.	
Fenofibrate	b.l.d.	
Diclofenac	44,36	0,34
Codeine	10,84	0,16
Oxazepam	19,48	0,43
Atenolol	52,90	0,22
Progesterone	b.l.d.	
Trimethoprim	b.l.d.	

Table S2: Basic physicochemical parameters of collected effluent

Parameters	
Conductivity (µS/cm)	950
TOC (mg/L)	24.6
Suspended Matter (mg/L)	5
P-PO4 (mg/L)	12.0
N-NO2 (mg/L)	59,2

Table S3: Kinetic constants calculated with the first-order Lagergren equation based on the sorption kinetic values of each PhAC for each experiment, NL corresponds to non-linear fits

		IBU	TRA	GEM	DOX	MET	NAP	KET	DIA	DCF	COD	OXA	ATE	PRO	TRI
S1	$logk_1$	-1.74	-1.71	-1.75	-1.73	-1.72	-1.85	-1.70	-1.70	-1.81	-1.73	-1.71	-1.72	-1.73	-1.74
	q_m	0.99	1.41	1.18	1.16	1.33	0.94	1.29	1.02	0.88	1.13	1.06	1.33	1.08	1.12
	r^2	0.94	0.95	0.95	0.96	0.95	0.92	0.94	0.94	0.90	0.95	0.94	0.95	0.96	0.95
N1	$logk_1$	-1.72	-1.78	-1.77	-1.74	-1.74	-1.73	-1.76	-1.76	-1.70	-1.76	-1.72	-1.73	-1.73	-1.73
	q_m	1.20	1.23	1.17	1.14	1.27	1.20	1.28	1.03	0.90	1.08	1.07	1.27	1.07	1.12
	r^2	0.96	0.97	0.97	0.96	0.95	0.97	0.95	0.95	0.96	0.95	0.94	0.95	0.95	0.95
S2	$logk_1$		-1.44	-1.05	-1.43	-1.43		-1.20	-1.35	-1.41	-1.41		-1.45	-1.43	-1.43
	q_m	NL	1.30	0.83	1.25	1.35	NL	1.10	0.79	0.65	1.02	NL	0.91	1.07	1.13
	r^2		0.93	0.78	0.96	0.93		0.91	0.92	0.94	0.92		0.96	0.96	0.96
N2	$logk_1$	-1.21	-1.43	-1.41	-1.43	-1.42	-1.39	-1.43	-1.45	-1.57	-1.40	-1.40	-1.40	-1.43	-1.43
	q_m	0.72	1.14	1.11	1.21	1.33	0.95	1.37	1.06	1.54	1.11	0.75	0.82	1.07	1.12
	r^2	0.94	0.96	0.95	0.96	0.96	0.97	0.96	0.96	0.97	0.95	0.96	0.98	0.96	0.95

With $logk_1$ the log of the first-order sorption rate constant, q_1 the modeling sorbed concentration at equilibrium in $mg.g^{-1}$, r^2 the correlation coefficient and NL corresponds to Non-Linear fit

Table S4: Kinetic constants calculated with the pseudo second-order equation based on the sorption kinetic values of each PhAC for each experiment, NL corresponds to non-linear fits

		IBU	TRA	GEM	DOX	MET	NAP	KET	DIA	DCF	COD	OXA	ATE	PRO	TRI
S1	$logk_2$	-2.81	-4.56	-3.10	-8.43	-5.24	-2.07	-3.82	-3.40	-3.44	-4.86	-3.47	-5.21	-6.39	-5.36
	q_m	2.34	24.9	4.15	1666.7	50.0	1.15	9.84	4.76	4.07	26.74	5.05	48.3	144.9	46.95
	r^2	0.96	1.00	0.99	1.00	1.00	0.95	0.99	0.99	0.99	1.00	0.99	1.00	1.00	0.99
	a	118.5	58.1	72.58	97.44	69.3	87.74	67.77	111.7	166.3	101.1	114,9	68.9	115.6	103.8
N1	$logk_2$	-7,47	-3.11	-3.08	-4.75	-3.65	-4.08	-3.57	-3.18	-4.11	-3.38	-4.83	-3.88	-4.21	-4.57
	q_m	-555.	4.60	4.00	23.75	7.95	12.55	7.38	3.71	9.31	4.87	23.75	10.3	11.89	19.05
	r^2	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	1.00
	a	96.45	60.6	74.85	98.95	70.5	76.41	68.50	110.6	148.1	100.1	119.4	71.3	113.8	101.8
S2	$logk_2$		-3.30	-1.32	-5.40	-3.02		-2.51	-1.91	-2.61	-2.38		-2.24	-6.85	-4,41
	q_m	NL	7.50	0.45	76.92	6.00	NL	2.84	1.03	1.76	2.20	NL	1.58	344.8	22.73
	r^2		0.99	0.96	1.00	0.99		0.99	0.97	0.99	0.99		0.98	1.00	0.99
	a		35.8	100.2	42.02	29.3		40.41	75.34	133.4	49.21	182.7	69.9	59.60	49.96
N2	$logk_2$	-2.71	-3.80	-3.55	-4.48	-3.45	-3.88	-4.24	-4.41	-2.04	-3.42	-2.68	-2.99	-6.22	-3.43
	q_m	-1.59	12.2	8.47	26.46	9.65	-10.1	-22.3	20.83	0.94	7.23	2.10	3.76	166.7	7.23
	r^2	0.90	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0,99	1.00	0.99
	a	202.9	42.5	49.4	43.1	30.3	74.4	35.01	58.6	123.5	50.3	109.5	68.9	59.2	51.3

With $logk_2$ the log of the second-order sorption rate constant, q_2 the modeling sorbed concentration at equilibrium in $mg.g^{-1}$, a the slope of the linear fit and r^2 the correlation coefficient and NL corresponds to Non-Linear fit

Table S5:.Kinetic constants calculated with the Bangham model based on the sorption kinetic values of each PhAC for each experiment, NL corresponds to non-linear fits

		IBU	TRA	GEM	DOX	MET	NAP	KET	DIA	DCF	COD	OXA	ATE	PRO	TRI
S1	$logk_b$	-2.10	-1.74	-1.79	-1.99	-1.83	-1.83	-1.78	-1.99	-2.19	-2.00	-2.08	-1.83	-2.06	-2.01
	r^2	0.97	0.99	0.99	1.00	1.00	0.97	0.99	0.99	0.99	0.99	0.99	0.99	1.00	0.99
	1/n	0.98	0.97	0.92	1.00	0.99	0.83	0.95	0.94	0.96	0.99	0.99	0.99	1.00	0.99
N1	$logk_b$	-2.03	-1.67	-1.81	-1.98	-1.81	-1.83	-1.80	-2.00	-2.08	-1.96	-2.08	-1.81	-2.05	-1.99
	r^2	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	1/n	1.03	0.89	0.92	0.99	0.96	0.95	0.95	0.94	0.94	0.95	1.00	0.95	0.99	0.98
S2	$logk_b$		-1.53	-1.95	-1.62	-1.44		-1.48	-1.78	-1.99	-1.63		-1.69	-1.77	-1.68
	r^2	NL	0.99	0.97	1.00	0.99	NL	0.99	0.99	0.98	0.99	NL	0.96	1.00	0.99
	1/n		0.96	0.82	1.00	0.93		0.84	0.84	0.86	0.89		0.89	1.00	0,98
N2	$logk_b$	-2.38	-1.56	-1.66	-1.63	-1.43	-1.83	-1.54	-1.76	-1.98	-1.68	-1.98	-1.66	-1.77	-1.73
	r^2	0.95	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	1.00	0.99
	1/n	1.09	0.93	0.96	0.99	0.94	0.97	1.01	0.99	0.85	0.96	0.92	0.93	1.00	0.99

With $logk_b$ the log of the Bangham sorption rate constant, 1/n the slope of the fit, r^2 the correlation coefficient and NL corresponds to Non Linear fits