

Supporting materials

Table S1 Chemical characteristics of secondary treated wastewater samples used in this study.

Chemical Parameter	Value
COD (mg/L)	69 ± 6
BOD (mg/L)	17 ± 3
TSS (mg/L)	21 ± 7
NH ₄ -N (mg/L)	0.9 ± 1.2
NO ₃ -N (mg/L)	2.6 ± 0.7
Total P (mg/L)	0.8 ± 0.1
pH	7.4 ± 0.2

Table S2 Experimental protocol used for emerging contaminants' removal during wastewater tertiary treatment. All experiments were conducted in triplicates.

Treatment	Membrane filter pore size	Pretreatment	Dose of oxidant/sorbent
Microfiltration	0.45 μm	–	–
Ultrafiltration	30 KDa	Microfiltration	–
Nanofiltration	1 KDa	Microfiltration	–
UV	–	Microfiltration	70 mW × sec × cm ⁻²
PAC	–	Microfiltration	20 mg/L

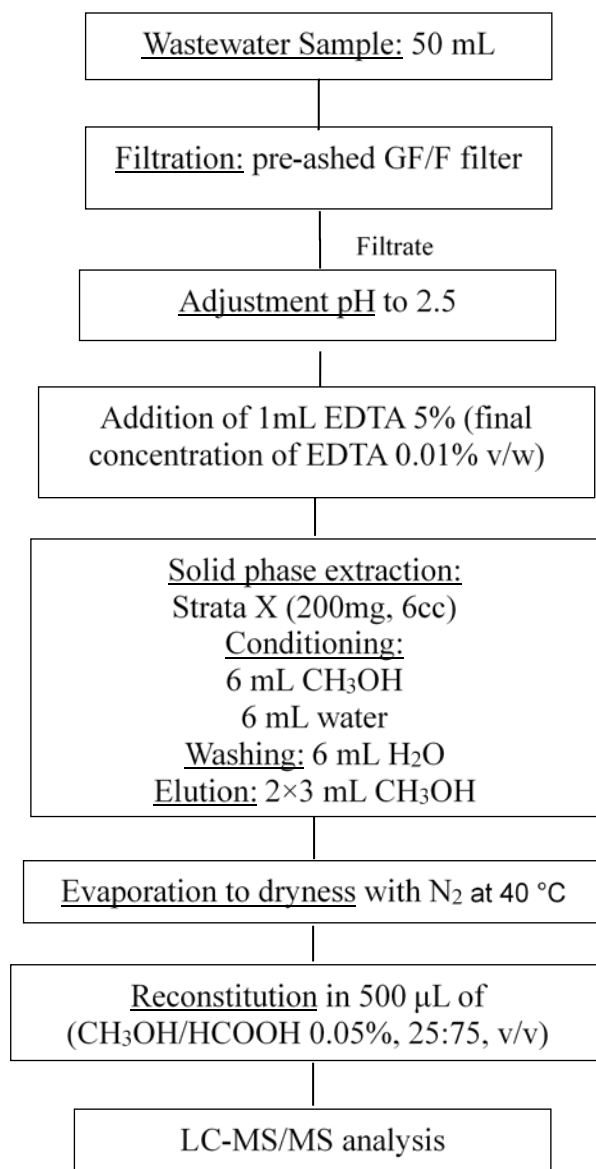


Fig. S1 Schematic diagram of the applied analytical method for the determination of the target pharmaceuticals (PhCs) in wastewater samples.

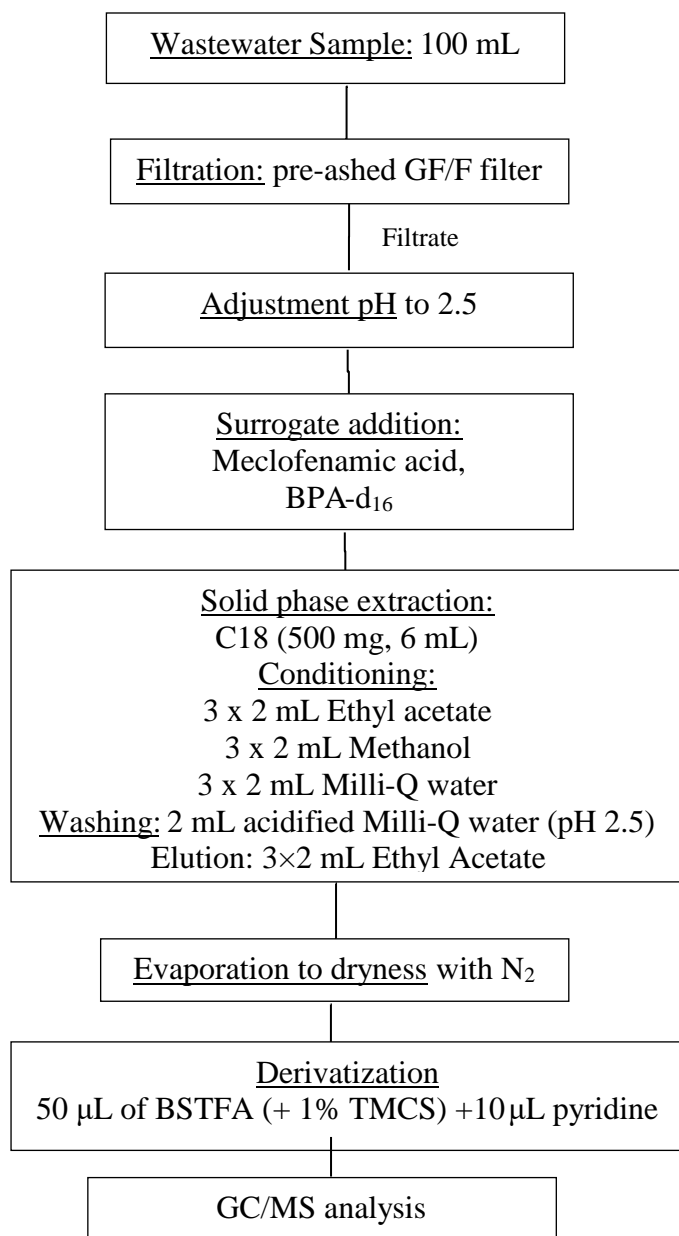


Fig. S2 Schematic diagram of the applied analytical method for the determination of the target endocrine disruptors (EDCs), NPX and DCF in wastewater samples.

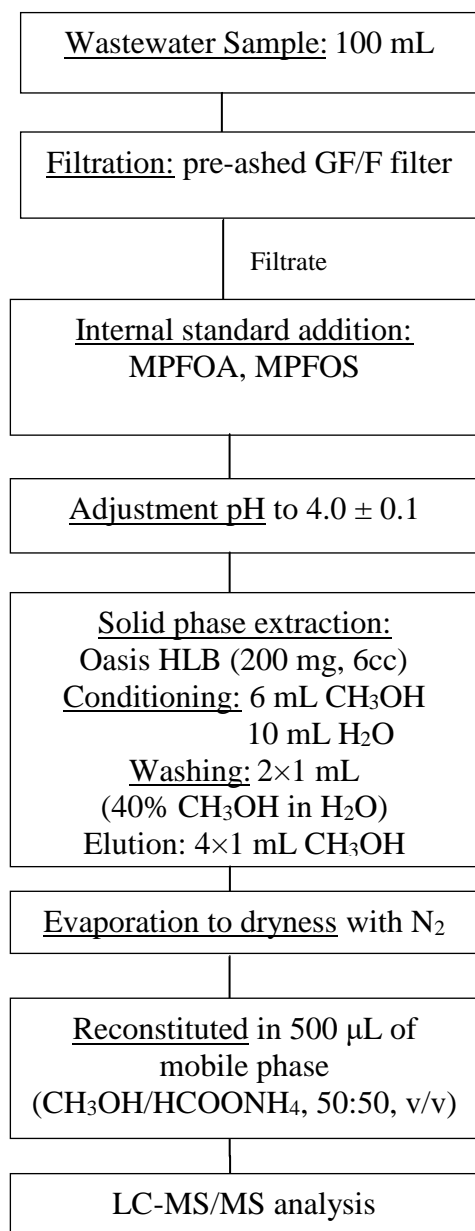


Fig. S3 Schematic diagram of the applied analytical method for the determination of the target perfluorinated compounds (PFCs) in wastewater samples.

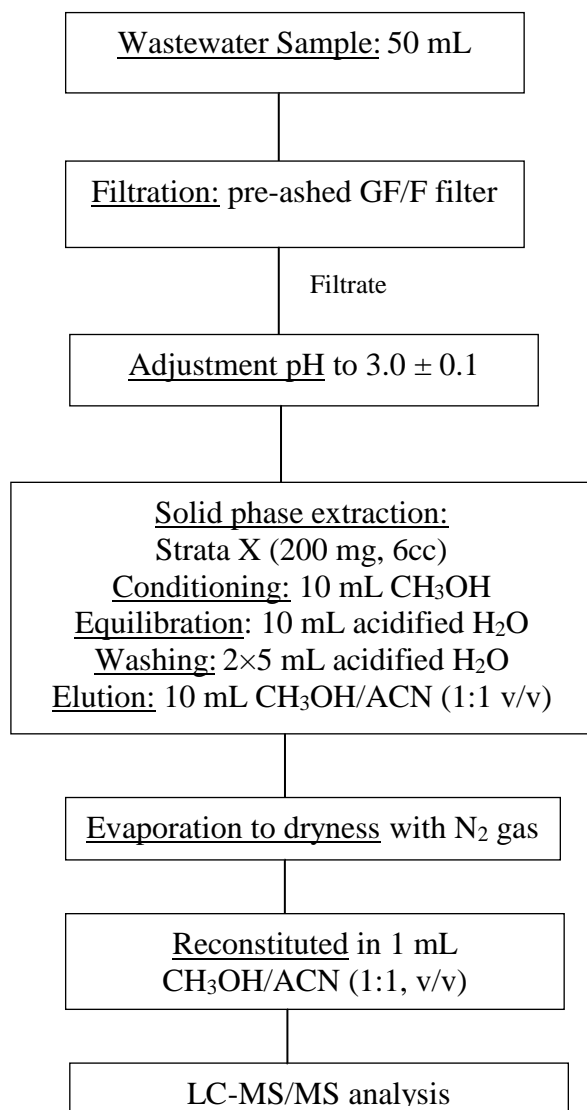


Fig. S4 Schematic diagram of the applied analytical method for the determination of the target benzotriazoles (BTRs) and benzothiazoles (BTHs) in wastewater samples.

Table S3 Recoveries (\pm Relative standard deviation; RSD %, N = 6) and methods' LODs and LOQs for the determination of emerging contaminants (ECs) in wastewater samples.

Class	Compound	LOD (ng/L)	LOQ (ng/L)	Mean Relative Recoveries \pm R.S.D % (N = 6)
PhCs	Atenolol (ATEN)	6.2	10	96.7 \pm 5.3
	Atorvastatin (ATV)	4.5	15	21.7 \pm 0.8
	Carbamazepin (CBZ)	21	70	104 \pm 9.0
	Caffeine (CAF)	7.0	23	107 \pm 6.0
	Cimetidine (CIM)	15	50	37.6 \pm 12.6
	Danofloxacin (DANO)	21	69	76.3 \pm 8.1
	Diclofenac (DFC)	0.77	2.4	98.4 \pm 1.9
	Difloxacin (DIF)	9.9	115	88.4 \pm 16.1
	Doxycycline (DC)	15	49	82.5 \pm 8.6
	Flumequine (FLU)	2.5	8.2	96.3 \pm 9.2
	Lincomycin (LINC)	5.9	20	79.0 \pm 7.4
	Methylprednisolone (MEP)	19	61	107 \pm 13.2
	Metronidazol (MTZ)	2.4	8.1	96.4 \pm 7.1
	Metroprolol (METO)	54	178	97.8 \pm 4.1
	Omeprazole (OMP)	1.1	3.5	107 \pm 11
	Oxolinic acid (OXO)	2.4	7.9	90.4 \pm 11.8
	Oxytetracycline (OTC)	7.0	23	99.4 \pm 9.2
	Penicilline G (PEN G)	37	121	98.9 \pm 15.6
	Propanolol (PPL)	5.2	17	83.6 \pm 3.6
	Ranitidine (RAN)	7.7	25	41.2 \pm 12.7
	Ronidazole (RZ)	1.1	3.8	96.0 \pm 4.6
	Tetracycline (TC)	23	76	96.4 \pm 6.7
	Tramadol (TRA)	6.2	21	100 \pm 4.8
	Trimethoprim (TRI)	1.7	5.7	98.5 \pm 2.8
EDCs	Valsatran (VAL)	8.9	29	80.5 \pm 6.5
	Nonylphenol (NP)	3.8	12	107 \pm 1.7
	Triclosan (TCS)	3.6	11	93.1 \pm 2.7
PFCs	Perfluorohexanoic acid (PFHxA)	0.44	1.5	94.2 \pm 4.4
	Perfluoroheptanoic acid (PFHpA)	0.60	2.0	96.8 \pm 4.0
	Perfluorooctanoic acid (PFOA)	0.72	2.4	91.2 \pm 3.3
	Perfluorononanoic acid (PFNA)	0.76	2.5	88.7 \pm 3.5
	Perfluorooctanesulfonate (PFOS)	0.18	0.58	92.5 \pm 1.5
BTRs	1H-benzotriazole (BTR)	0.77	2.5	106 \pm 9.9
	5,6-dimethyl-1H-benzotriazole (5,6 DMTR or XTR)	0.34	1.1	102 \pm 10.0
	1-hydroxybenzotriazole (OHBTR)	3.1	10	98.4 \pm 10.0
	Tolyltriazole (TTR)	0.13	0.42	107 \pm 12.0
BTHs	2-aminobenzothiazole (ABTH)	4.2	14	112 \pm 11
	Benzothiazole (BTH)	17	55	102 \pm 9.3

Table S4 Concentrations of the emerging contaminants (ECs) in the secondary treated wastewater (in ng/L). An asterisk has been added to indicate target compounds that were spiked.

Class	Compound	Secondary treated wastewater (ng/L)
PhCs	Atenolol (ATEN)	2803 ± 318
	Atorvastatin (ATV)	444 ± 12
	Carbamazepin (CBZ)	2451 ± 430
	Caffeine (CAF)	2417 ± 388
	Cimetidine (CIM)	3124 ± 695
	Danofloxacin (DANO)	1138 ± 223
	Diclofenac (DFC)	532 ± 69
	Difloxacin (DIF)	1578 ± 25
	Doxycycline (DC)	2170 ± 385
	Flumequine (FLU)	1997 ± 144
	Lincomycin (LINC)	2209 ± 338
	Methylprednisolone (MEP)	580 ± 57
	Metronidazol (MTZ)	2884 ± 417
	Metroprolol (METO)	2121 ± 268
	Omeprazole (OMP)	1525 ± 307
	Oxolinic acid (OXO)	2952 ± 110
	Oxytetracycline (OTC)	1016 ± 166
	Penicilline G (PEN G)	732 ± 74
	Propanolol (PPL)	978 ± 208
	Ranitidine (RAN)	216 ± 47
	Ronidazole (RZ)	2353 ± 158
	Tetracycline (TC)	1195 ± 672
	Tramadol (TRA)	1400 ± 141
Trimethoprim (TRI)	1227 ± 140	
Valsatran (VAL)	3177 ± 891	
EDCs	Nonylphenol (NP)	1033 ± 68
	Triclosan (TCS)	51 ± 9
PFCs*	Perfluorohexanoic acid (PFHxA)	803 ± 14
	Perfluoroheptanoic acid (PFHpA)	1053 ± 17
	Perfluorooctanoic acid (PFOA)	1123 ± 37
	Perfluorononanoic acid (PFNA)	1073 ± 61
	Perfluorooctanesulfonate (PFOS)	1217 ± 53
BTRs*	1H-benzotriazole (BTR)	1547 ± 227
	5,6-dimethyl-1H-benzotriazole (5,6 DMTR or XTR)	961 ± 136
	1-hydroxybenzotriazole (OHBTR)	998 ± 86
	Tolyltriazole (TTR)	6801 ± 802
BTHs*	2-aminobenzothiazole (ABTH)	998 ± 158
	Benzothiazole (BTH)	1104 ± 197

Notes: * wastewater samples were spiked at a concentration level of 1000 ng/L for each of them analyte.