

Supplementary Materials: Pharmaceutical Compounds in Aquatic Environments—Occurrence, Fate and Bioremediation Prospective

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Table S1. Pharmaceutical's concentration detected in surface water samples (expressed in ng/L).

Therapeutic Class	Pharmaceutical	Location	Concentration (ngL ⁻¹)	Reference
Antibiotics	Ciprofloxacin	Spain	34.6	[1]
		Spain	740	[2]
		Spain	23	[3]
		Spain	0.53–20.00	[4]
		Serbia	28.2	[5]
		Spain	34.6	[6]
		Spain	17–540	[7]
	Norfloxacin	Spain	37.2	[1]
		Spain	54	[2]
		Spain	37.2	[6]
		Spain	5–62	[7]
Antibiotics	Ofloxacin	Spain	50.2	[1]
		Spain	400	[2]
		Spain	20–33	[3]
		Spain	0.07–109.50	[4]
		France	3.2	[8]
		Spain	50.2	[6]
		Spain	15.6	[1]
	Sulfamethoxazole	Portugal	9.14–53.3	[9]
		Spain	33	[2]
		USA	66.7	[10]
Antibiotics	Trimethoprim	Spain	16–79	[3]
		UK	1.8	[11]
		Spain	0.16–41.51	[4]
		France	1.9	[8]
		Spain	15.6	[6]
		Spain	19–227	[7]
		Mexico	76–722	[12]
	Trimethoprim	Spain	3.0	[1]
		Portugal	3.89 to 15.7	[9]
		Spain	151	[2]
Antibiotics	Erythromycin	USA	4.1	[10]
		Spain	5–9	[3]
		UK	22	[11]
		Spain	0.49–150.43	[4]
		Serbia	8.1	[5]
		France	0.9	[8]
		Spain	3.0	[6]
	Erythromycin	Spain	3–2046	[7]
		Mexico	34–120	[12]
		UK	132–1378	[13]
	Erythromycin	Spain	78	[2]
		Spain	0.45–18.58	[4]

Antibiotics	Erythromycin-H ₂ O	Serbia	292	[5]	
		Portugal	38.80	[14]	
		USA	12.1	[10]	
		Spain	91	[2]	
		USA	17.6	[10]	
		Spain	59	[3]	
		UK	43.5	[11]	
		Spain	0.09–65.63	[4]	
		Serbia	616	[5]	
		Portugal	39.10	[14]	
	Enrofloxacin	Spain	70	[2]	
	Lincomycin	Spain	47	[2]	
	Pefloxacin	Spain	64	[2]	
	Roxithromycin	Spain	12	[2]	
		France	4.9	[8]	
	Sarafloxacin	Spain	55	[2]	
	Sulfamethizole	USA	15.6	[10]	
	Flumequine	Spain	20	[2]	
		Spain	5–41	[3]	
	Azithromycin	Spain	2.26–33.22	[4]	
		Portugal	35.66	[14]	
	Cefalexin	Spain	0.40–1.40	[4]	
		Serbia	283	[5]	
	Tetracycline	Spain	5.92–27.40	[4]	
	Nalidixic Acid	Spain	14	[2]	
	Oxolinic Acid	Spain	23	[2]	
	Pipedimic acid	Spain	245	[2]	
	Metronidazole	Spain	0.96–65.93	[4]	
		France	0.3	[8]	
	Moxifloxacin	Spain	205	[2]	
	Mefenamic acid	UK	9–97	[13]	
	Diclofenac	Sulfadiazine	7–51	[7]	
		Spain	16.9	[1]	
		France	1.36–33.2	[15]	
		UK	76–2991	[13]	
		Spain	16.9	[6]	
		Spain	358	[2]	
		Spain	18–52	[3]	
		UK	21.5	[11]	
		Spain	26.63–280	[4]	
		Serbia	324	[5]	
Nonsteroidal anti-inflammatory drug (NSAIDs)		France	5.4	[8]	
		Spain	22–650	[7]	
		Portugal	51.24	[14]	
		Mexico	258–1398	[12]	
		Spain	59.0	[1]	
		France	4.5	[15]	
		UK	205–4838	[13]	
		Spain	2850	[2]	
		USA	37.9	[10]	
Ibuprofen	Spain	380	[3]		
	UK	27.5	[11]		
	Spain	3.91–867.82	[4]		
	Serbia	346	[5]		
	France	5.5	[8]		
	Spain	59	[6]		

Nonsteroidal anti-inflammatory drug (NSAIDs)	Ibuprofen	Mexico	184–1106	[12]
		France	14.5	[15]
		Spain	70	[2]
	Ketoprofen	Spain	6.37–356.79	[4]
		Serbia	45	[5]
		France	3.4	[8]
		Spain	4–57	[7]
	Tenoxicam	Spain	0.02–1.59	[4]
		France	9.1	[15]
		Spain	285	[2]
		USA	8.2	[10]
	Naproxen	Spain	7–156	[3]
		UK	127	[11]
		Spain	12.21–289.47	[4]
		Serbia	74.2	[5]
		France	3.5	[8]
		Mexico	732–4880	[12]
Antidepressants	Piroxicam	Spain	5–11	[3]
		Spain	0.03–5.06	[4]
		Spain	74	[3]
	Meloxicam	Spain	0.01–4.00	[4]
		Serbia	1.8	[5]
		Spain	11	[3]
	Indomethacin	Spain	1.55–137.44	[4]
		Serbia	19.5	[5]
	Indomethacin	Mexico	19–362	[12]
		Spain	12	[3]
	Phenazone	Spain	0.07–40.72	[4]
		Serbia	12.5	[5]
	Norfluoxetine	Spain	0.84–3.26	[4]
	Sertraline	Spain	1.06–144.87	[4]
		Portugal	23.30	[14]
	Paroxetine	Spain	40	[3]
Antidepressants	Paroxetine	Spain	0.27–3.41	[4]
		Spain	575	[2]
		Spain	43	[3]
	Venlafaxine	UK	31.1	[11]
		Spain	1.15–127.62	[4]
		Serbia	5.3	[5]
		Spain	9–11	[3]
	Citalopram	Spain	0.08–31.83	[4]
		Portugal	52.97	[14]
	Trazadone	Spain	4	[3]
		Spain	0.04–40.04	[4]
	Fluoxetine	Spain	0.59–17.28	[4]
	Fenofibrate	Spain	21.4	[6]
		France	2.3	[15]
		USA	38.2	[10]
		Spain	304	[2]
Blood lipid lowering agents	Gemfibrozil	Spain	9.80–302.67	[4]
		Spain	22–284	[3]
		Portugal	10.34	[14]
		Mexico	9–368	[12]
	Pravastatin	France	1.6	[8]
		Spain	0.53–10.81	[4]
	Bezafibrate	France	3.4	[8]

Blood lipid lowering agents	Atorvastatin	UK	42.1	[11]
		Spain	49	[2]
		Spain	0.82–55.64	[4]
		Spain	16	[3]
		Serbia	18.18	[5]
	Fluvastatin	Spain	8–67	[7]
		Portugal	15.52	[14]
	Fenofibric acid	Mexico	286–2100	[12]
		UK	7	[11]
		Spain	42	[2]
		Spain	0.12–8.64	[4]
		Spain	2–3	[3]
		Serbia	9.09	[5]

Table S2. Pharmaceutical's concentration detected in groundwater samples (expressed in ng/L).

Therapeutic Class	Pharmaceutical	Location	Concentration (ngL ⁻¹)	Reference
Antibiotics	Azithromycin	Spain	30.7–1620	[16]
	Clarithromycin	Spain	2.87–20.5	[16]
	Chlortetracycline	Spain	34.2	[16]
	Ciprofloxacin	Spain	51–443	[16]
	Danofloxacin	Spain	58.7–543	[16]
	Doxycycline	Spain	27.6–188	[16]
	Enoxacin	Spain	69.3–323	[16]
	Enrofloxacin	Spain	65.2–264	[16]
	Erythromycin	Spain	41.3	[16]
	Norfloxacin	Spain	81–462	[16]
	Oflloxacin	Spain	43.3–367	[16]
	Oxytetracycline	Spain	12.2–41	[16]
	Roxithromycin	Spain	3.23–23.8	[16]
		France	1.3	[8]
	Flumequine	Spain	6.05–10.3	[16]
	Josamycin	Spain	3.8	[16]
	Spiramycin	Spain	17.2–2980	[16]
	Sulfadiazine	Spain	37.1–208	[16]
	Sulfamethazine	Spain	29.1–29.2	[16]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Sulfamethoxazole	Spain	18.2–65	[16]
		France	3.0	[8]
	Tetracycline	Spain	56.3–141	[16]
	Tilmicosin	Spain	5.71–820	[16]
	Trimethoprim	Spain	4.89–9.41	[16]
		France	1.4	[8]
	Diclofenac	Spain	1.17–380	[16]
		France	9.7	[8]
	Ibuprofen	Serbia	92	[5]
		Spain	2.12–988	[16]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Naproxen	Serbia	27.6	[5]
		Spain	5.59	[16]
	Naproxen	France	1.2	[8]
	Phenazone	Serbia	23.4	[5]
		Spain	2.13–39.7	[16]
	Ketoprofen	Spain	29.5–215	[16]
	Mefenamic acid	France	[8]	[8]
		Spain	13.5–64.3	[16]

Antidepressants	Fluoxetine	Spain	21	[16]
	Paroxetin	Spain	5.17–30.2	[16]
Blood lipid lowering agents	Fenofibric acid	France	0.4	[8]
	Atorvastatin	Spain	5.12–15.9	[16]
	Bezafibrate	Spain	0.527–25.8	[16]
	Fenofibrate	Spain	22.3–74.2	[16]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Gemfibrozil	Spain	0.821–751	[16]
	Pravastatin	Spain	12.2	[16]

Table S3. Pharmaceutical's concentration detected in seawater samples (expressed in ng/L).

Therapeutic Class	Pharmaceutical	Location	Concentration (ngL ⁻¹)	Reference
Antibiotics	Clarithromycin	Spain	17	[3]
	Ofoxacin	Spain	2	[3]
	Sulfamethoxazole	Spain	9	[3]
	Trimethoprim	Spain	1	[3]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Diclofenac	Spain	4	[3]
	Ibuprofen	Spain	16	[3]
	Indomethacin	Spain	3	[3]
	Naproxen	Spain	6	[3]
Antidepressants	Phenazone	Spain	2	[3]
	Citalopram	Spain	4	[3]
	Venlafaxine	Spain	52	[3]
	Trazadone	Spain	1	[3]
Blood lipid lowering agents	Gemfibrozil	Spain	23	[3]
	Atorvastatin	Spain	1	[3]
	Bezafibrate	Spain	2	[3]

Table S4. Pharmaceutical's concentration detected in drinking water samples (expressed in ng/L).

Therapeutic Class	Pharmaceutical	Location	Concentration (ngL ⁻¹)	Reference
Antibiotics	Sulfamethoxazole	Spain	0.5	[3]
		Portugal	1.3	[17]
		USA	12.7	[18]
		USA	1.3–8.2	[19]
		USA	113	[20]
		Switzerland	15–17	[21]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Sulfadiazine	Portugal	1	[17]
	Sulfamethazine	Portugal	0.5	[17]
	Sulfapyridine	Portugal	1.9	[17]
	Erythromycin	Portugal	5	[17]
	Erythromycin-H ₂ O	USA	13.8	[18]
	Clarithromycin	USA	0.2	[18]
		USA	19.8	[18]
	Trimethoprim	USA	1.7–4.7	[19]
		USA	0.7	[20]
		Switzerland	0.4–3	[21]
	Sulfamethizole	USA	1	[20]
	Lincomycin	USA	2.0–4.4	[19]
	Azithromycin	Switzerland	10	[21]
	Norfloxacin	Switzerland	2	[21]
	Ibuprofen	USA (raw)	5850	[22]
		USA (finished)	930	[22]
		France	0.6	[15]
		Spain	5	[3]
		Portugal	0.021	[17]
		USA	10.2	[18]

Nonsteroidal anti-inflammatory drug (NSAIDs)	Diclofenac	USA	2.0–72.8	[19]
		Spain	21.24	[6]
		France	2.5	[15]
		Portugal	11	[17]
	Ketoprofen	USA	9.4	[18]
		Switzerland	0.7–3	[21]
		France	3.0	[15]
		Serbia	16	[5]
	Naproxen	Switzerland	4–8	[21]
		France	0.2	[15]
		Portugal	6	[17]
		USA	5.1	[18]
Antidepressants	Indomethacin	Switzerland	4–12	[21]
		Spain	6	[3]
	Fluoxetine	Portugal	37	[17]
		USA	19.2	[18]
Blood lipid lowering agents	Amitryptilline	France	1.4	[15]
		USA	1.2	[20]
	Gemfibrozil	Portugal	18	[17]
		Spain	8	[3]
	Atorvastatin	Spain	1	[3]

Table S5. Pharmaceutical's concentration detected in sediment and soils samples (expressed in ng/g).

Therapeutic Class	Pharmaceutical	Location	Concentration (ng g ⁻¹)	Reference
Antibiotics	Ciprofloxacin	Spain	4.6–7.3	[1]
		Spain	5.95	[6]
		Spain	0.10–3.79	[4]
		China	42	[23]
Antibiotics	Norfloxacin	Spain	6.8–8.4	[1]
		Malaysia	18–96	[24]
	Ofloxacin	China	17.9	[23]
		Spain	8.95–12.03	[6]
Antibiotics	Sulfamethoxazole	Spain	0.09–2.99	[4]
		Spain	2.7–3.3	[1]
		Spain	1.1	[1]
	Tetracycline	USA	0.7	[10]
		Spain	0.07–0.26	[4]
		Poland	2.34–419.2	[25]
Antibiotics	Trimethoprim	Spain	6.5	[1]
		Spain	5.92	[4]
		Spain	0.2–1.6	[1]
		Spain	0.02–0.25	[26]
		USA	18.2	[10]
	Sulfamethoxypyridazine	Spain	0.03–0.19	[4]
		Poland	1.74–2.46	[25]
		Malaysia	3–60	[24]
		Spain	0.11–0.37	[26]
		Spain	0.24–1.15	[26]
Antibiotics	Sulfamethazine	Poland	1.76	[25]
	Erythromycin	Spain	1.13	[4]
	Erythromycin-H ₂ O	USA	3.4	[10]
	Azithromycin	Spain	23.92	[4]
	Clarithromycin	Spain	12.72	[4]
	Cefalexin	Spain	0.40	[4]

Antibiotics	Metronidazole	Spain	0.12–12.61	[4]
	Sulfamethiazole	Poland	12.85–20.84	[25]
	Doxycycline	Malaysia	63–728	[24]
		Malaysia	36–378	[24]
	Enrofloxacin	China	24.4	[23]
		Brazil	26.69	[27]
	Flumequine	Malaysia	8–1331	[24]
	Tylosin	Malaysia	6–679	[24]
	Lomefloxacin	China	11	[23]
	Sulfachloropyridazine	Poland	0.47–1.07	[25]
	Sulfathiazole	Poland	1.77	[25]
	Chloramphenicol	Spain	0.17–2.10	[26]
		Spain	0.81–15.39	[26]
	Diclofenac	Spain	1.29–4.14	[4]
		Poland	2.1	[28]
		Spain	0.91–24.93	[26]
	Ibuprofen	Spain	12.56	[4]
		Poland	1.0–8.0	[28]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Indomethacin	Spain	0.47–8.99	[26]
		Spain	0.47–2.94	[4]
	Phenazone	Spain	0.06	[4]
	Ketoprofen	Spain	5.79–12.54	[4]
	Naproxen	Spain	0.82–3.38	[4]
	Piroxicam	Spain	0.15	[4]
	Meloxicam	Spain	0.08	[4]
	Tenoxicam	Spain	0.66	[4]
	Flurbiprofen	Poland	6.5–8.8	[28]
	Mefenamic acid	Spain	0.18–3.34	[26]
Antidepressants	Fluoxetine	Spain	0.34	[4]
	Norfluoxetine	Spain	0.14–0.60	[4]
	Paroxetine	Spain	0.05–0.76	[4]
	Sertraline	Spain	1.15– 119.28	[4]
	Citalopram	Spain	0.23–7.79	[4]
	Venlafaxine	Spain	0.05–1.94	[4]
Antidepressants	Trazodone	Spain	0.09–8.08	[4]
	Bezafibrate	Spain	0.09–0.41	[4]
	Gemfibrozil	Spain	0.16–1.92	[4]
		Spain	0.08–0.39	[26]
Blood lipid lowering agents	Atorvastatin	Spain	0.03–0.65	[4]
	Pravastatin	Spain	0.30	[4]
	Fluvastatin	Spain	0.22–4.53	[4]
	Fenofibrate	Spain	16.1	[1]
		Spain	13.20–17.23	[6]

Table S6. Pharmaceutical's concentration detected in sludge samples (expressed in ng/g).

Therapeutic Class	Pharmaceutical	Location	Concentration (ng g ⁻¹)	Reference
Antibiotics	Trimethoprim	UK	21.5	[11]
		Malaysia	9–3412	[24]
	Doxycycline	Malaysia	309–78516	[24]
		China	1050–10910	[29]
	Enrofloxacin	Malaysia	112–26863	[24]
		Brazil	30970	[27]
	Erythromycin	China	33260–1420760	[29]
		Malaysia	12–32	[24]
	Norfloxacin	Malaysia	31–1886	[24]
		Brazil	4550	[27]
	Sulfadiazine	China	2760–225450	[29]
		Malaysia	12–5773	[24]
	Tilmicosin	China	800–3120	[27]
		Malaysia	13–85	[24]
	Tylosin	Malaysia	100–13740	[24]
	Ciprofloxacin	Brazil	2130	[27]
		China	29590–45590	[29]
	Fleroxacin	China	2220–99430	[29]
	Flumequine	Malaysia	21–51912	[24]
	Sulfamethoxazole	China	840–2800	[29]
	Oxytetracycline	China	10560–59590	[29]
	Chlortetracycline	China	17680–27590	[29]
	Methacycline	China	960–5860	[29]
	Lomefloxacin	China	5530–44160	[29]
	Danofloxacin	China	2480–3060	[29]
	Sulfanilamide	China	40–1590	[29]
	Sulfamerazine	China	90–660	[29]
	Sulfadimidine	China	180–6040	[29]
	Difloxacin	China	2630–12380	[29]
	Sulfamonomethoxine	China	60–4080	[29]
	Sulfaguanidine	China	250–1550	[29]
	Sulfachloropyridazine	China	360–3510	[29]
Nonsteroidal anti-inflammatory drug (NSAIDs)	Ibuprofen	UK	174	[11]
		Poland	96	[28]
	Diclofenac	UK	23.5	[11]
		Poland	20	[28]
	Naproxen	UK	39.8	[11]
		Poland	10	[28]
Antidepressants	Flurbiprofen	Poland	98	[28]
	Citalopram	UK	657	[11]
	Venlafaxine	UK	37.9	[11]
	Fluoxetine	UK	188	[11]
	Sertraline	UK	1138	[11]
	Norfluoxetine	UK	124	[11]
	Mirtazapine	UK	66.1	[11]

Table S7. Pharmaceutical's concentration detected in wastewaters effluent samples (expressed in ng/L).

Therapeutic Class	Pharmaceutical	Location	Concentration (ng L ⁻¹)	Reference
Antibiotics	Erythromycin	UK	466–1857	[13]
		Spain	82	[2]
		Spain	14–17	[3]
		China	42–244.0	[30]
Antibiotics	Ciprofloxacin	Spain	2292	[2]
		Spain	104–245	[3]
		USA	2200	[31]
		Serbia	278	[5]
		Spain	3194–4719	[7]
		Spain	247	[2]
Antibiotics	Clarithromycin	Spain	19–192	[3]
		UK	1065	[11]
		USA	8100	[31]
		Spain	220	[2]
		USA	34	[31]
		Spain	41	[2]
Antibiotics	Flumequine	USA	15.6	[31]
		Spain	142	[2]
		USA	32	[31]
		Spain	60	[2]
		Spain	540	[2]
		China	5.1–7.7	[30]
Antibiotics	Azithromycin	Spain	31–170	[3]
		UK	87.2	[11]
		China	20.7–446.5	[30]
		USA	1300	[31]
		Spain	157–191	[3]
		China	26.7–310.0	[30]
Antibiotics	Ofloxacin	USA	2100	[31]
		Serbia	220	[5]
		Spain	925	[2]
		Spain	222	[3]
		UK	47.5	[11]
		China	44.5–1296.3	[30]
Antibiotics	Sulfamethoxazole	USA	7400	[31]
		Serbia	432	[5]
		Spain	432	[2]
		Spain	190–8963	[7]
		Mexico	440–1215	[12]
		Spain	10–100	[3]
Antibiotics	Trimethoprim	UK	769	[11]
		China	6.7–188.0	[30]
		USA	570	[31]
		Serbia	259	[5]
		Spain	232	[2]
		Spain	61–5843	[7]
Antibiotics	Penicillin	Mexico	130–395	[12]
		USA	30	[31]
		USA	60	[31]
		Serbia	803	[5]
		USA	160	[31]
		USA	30	[31]
Antibiotics	Penicillin	USA	86	[31]

Antibiotics	Sarafloxacin	USA	130	[31]
		Spain	52	[2]
		China	14–189.7	[30]
	Sulfadiazine	USA	20	[31]
		Spain	24–5477	[7]
		China	2–48.6	[30]
	Sulfamethazine	USA	40	[31]
		Spain	11	[2]
	Sulfadimethoxine	USA	52	[31]
	Sulfachloropyridazine	USA	30	[31]
	Pefloxacin	Spain	122	[2]
		China	9.4–134.3	[30]
	Norfloxacin	USA	140	[31]
		Spain	310	[2]
		Spain	40–463	[7]
		China	36.5–512.4	[30]
	Roxithromycin	USA	120	[31]
		Spain	18	[2]
	Sulfathiazole	USA	92	[31]
		Spain	30	[2]
	Pipedimic acid	Spain	430	[2]
	Mefenamic acid	UK	15–108	[13]
	Metronidazole	Spain	121	[3]
		France	210.7–486.4	[15]
		UK	401–2830	[13]
		Spain	690	[2]
		Spain	184–376	[3]
	Diclofenac	UK	436	[11]
		China	1.0–4.7	[30]
		Serbia	1338	[5]
		Mexico	466–2180	[12]
		Spain	683–1932	[7]
		France	17.7–219.0	[15]
		UK	863–4617	[13]
	Ibuprofen	Spain	15100	[2]
		UK	1290	[11]
		China	3.5–41.6.	[30]
		USA	4500	[31]
		Serbia	20130	[5]
		France	21.8–1080.6	[15]
		Spain	583	[2]
	Ketoprofen	Spain	39–560	[3]
		Serbia	247	[5]
		Spain	13–374	[7]
	Naproxen	France	42.1–289.1	[15]
		Spain	710	[2]
		Spain	97–150	[3]
		UK	3516	[11]
	Naproxen	USA	3000	[31]
		Serbia	208	[5]
		China	6.7–7.7	[30]
		Mexico	49–392	[12]
	Phenazone	Spain	9–49	[3]
		Serbia	13.5	[5]
	Piroxicam	Spain	87	[3]
	Meloxicam	Spain	735	[3]

Antidepressants	Tenoxicam	Serbia	5.0	[5]
	Indomethacin	Spain	19	[3]
	Citalopram	Mexico	38–305	[12]
		Spain	49–288	[3]
		UK	323	[11]
	Venlafaxine	China	2–162	[32]
		Spain	364–376	[3]
		UK	355	[11]
		Serbia	154	[5]
		Spain	875	[2]
	Trazodone	Spain	29	[3]
	Amitryptiline	France	6.0	[15]
		Spain	28	[3]
	Fluoxetine	UK	26.5	[11]
		China	10	[32]
		USA	50	[31]
	Paroxetine	Spain	386	[3]
	Sertraline	UK	47	[11]
	Mirtazapine	China	9–59	[32]
	Chlorimipramine	UK	55	[11]
	Norfluoxetine	China	4–35	[32]
		UK	30	[11]
	Gemfibrozil	France	13.3–17.2	[15]
		USA	190	[31]
		China	0.6–10.2	[30]
		Spain	2008	[2]
	Bezafibrate	Spain	178–1018	[3]
		Mexico	20–380	[12]
		China	2.7–128.1	[30]
		UK	892	[11]
	Blood lipid lowering agents	Spain	312	[2]
		Spain	7–26	[3]
		Spain	40–132	[7]
		Mexico	265–950	[12]
	Atorvastatin	China	0.7–0.8	[30]
		UK	60.5	[11]
		Spain	209	[2]
		Spain	27–111	[3]
		Serbia	40.5	[5]
		Canada	10–122	[33]
	Pravastatin	Spain	69	[2]
		Spain	36	[3]
	Fluvastatin	Spain	12	[3]
	Simvastatin	China	8.4–129	[30]
	Rosuvastatin	Canada	190–552	[33]

References

1. Vazquez-Roig, P.; Andreu, V.; Blasco, C.; Picó, Y. Risk assessment on the presence of pharmaceuticals in sediments, soils and waters of the Pego–Oliva Marshlands (Valencia, eastern Spain). *Sci. Total Environ.* **2012**, *440*, 24–32, doi:10.1016/j.scitotenv.2012.08.036.
2. Gracia-Lor, E.; Sancho, J. V.; Hernández, F. Multi-class determination of around 50 pharmaceuticals, including 26 antibiotics, in environmental and wastewater samples by ultra-high performance liquid chromatography–tandem mass spectrometry. *J. Chromatogr. A* **2011**, *1218*, 2264–2275, doi:10.1016/j.chroma.2011.02.026.

3. Gros, M.; Rodríguez-Mozaz, S.; Barceló, D. Fast and comprehensive multi-residue analysis of a broad range of human and veterinary pharmaceuticals and some of their metabolites in surface and treated waters by ultra-high-performance liquid chromatography coupled to quadrupole-linear ion trap tandem. *J. Chromatogr. A* **2012**, *1248*, 104–121, doi:10.1016/j.chroma.2012.05.084.
4. Osorio, V.; Larrañaga, A.; Aceña, J.; Pérez, S.; Barceló, D. Concentration and risk of pharmaceuticals in freshwater systems are related to the population density and the livestock units in Iberian Rivers. *Sci. Total Environ.* **2016**, *540*, 267–277, doi:10.1016/j.scitotenv.2015.06.143.
5. Petrović, M.; Škrbić, B.; Živančev, J.; Ferrando-Climent, L.; Barcelo, D. Determination of 81 pharmaceutical drugs by high performance liquid chromatography coupled to mass spectrometry with hybrid triple quadrupole–linear ion trap in different types of water in Serbia. *Sci. Total Environ.* **2014**, *468*, 415–428, doi:10.1016/j.scitotenv.2013.08.079.
6. Vazquez-Roig, P.; Segarra, R.; Blasco, C.; Andreu, V.; Picó, Y. Determination of pharmaceuticals in soils and sediments by pressurized liquid extraction and liquid chromatography tandem mass spectrometry. *J. Chromatogr. A* **2010**, *1217*, 2471–2483, doi:10.1016/j.chroma.2009.11.033.
7. Mijangos, L.; Ziarrusta, H.; Ros, O.; Kortazar, L.; Fernández, L.A.; Olivares, M.; Zuloaga, O.; Prieto, A.; Etxebarria, N. Occurrence of emerging pollutants in estuaries of the Basque Country: Analysis of sources and distribution, and assessment of the environmental risk. *Water Res.* **2018**, *147*, 152–163, doi:10.1016/j.watres.2018.09.033.
8. Vulliet, E.; Cren-Olivé, C. Screening of pharmaceuticals and hormones at the regional scale, in surface and groundwaters intended to human consumption. *Environ. Pollut.* **2011**, *159*, 2929–2934, doi:10.1016/j.envpol.2011.04.033.
9. Madureira, T.V.; Barreiro, J.C.; Rocha, M.J.; Rocha, E.; Cass, Q.B.; Tiritan, M.E. Spatiotemporal distribution of pharmaceuticals in the Douro River estuary (Portugal). *Sci. Total Environ.* **2010**, *408*, 5513–5520, doi:10.1016/j.scitotenv.2010.07.069.
10. Klosterhaus, S.L.; Grace, R.; Hamilton, M.C.; Yee, D. Method validation and reconnaissance of pharmaceuticals, personal care products, and alkylphenols in surface waters, sediments, and mussels in an urban estuary. *Environ. Int.* **2013**, *54*, 92–99, doi:10.1016/j.envint.2013.01.009.
11. Petrie, B.; Youdan, J.; Barden, R.; Kasprzyk-Hordern, B. Multi-residue analysis of 90 emerging contaminants in liquid and solid environmental matrices by ultra-high-performance liquid chromatography tandem mass spectrometry. *J. Chromatogr. A* **2016**, *1431*, 64–78, doi:10.1016/j.chroma.2015.12.036.
12. Rivera-Jaimes, J.A.; Postigo, C.; Melgoza-Alemán, R.M.; Aceña, J.; Barceló, D.; López de Alda, M. Study of pharmaceuticals in surface and wastewater from Cuernavaca, Morelos, Mexico: Occurrence and environmental risk assessment. *Sci. Total Environ.* **2018**, *613*, 1263–1274, doi:10.1016/j.scitotenv.2017.09.134.
13. Kay, P.; Hughes, S.R.; Ault, J.R.; Ashcroft, A.E.; Brown, L.E. Widespread, routine occurrence of pharmaceuticals in sewage effluent, combined sewer overflows and receiving waters. *Environ. Pollut.* **2017**, *220*, 1447–1455, doi:10.1016/j.envpol.2016.10.087.
14. Pereira, A.M.P.T.; Silva, L.J.G.; Laranjeiro, C.S.M.; Meisel, L.M.; Lino, C.M.; Pena, A. Human pharmaceuticals in Portuguese rivers: The impact of water scarcity in the environmental risk. *Sci. Total Environ.* **2017**, *609*, 1182–1191, doi:10.1016/j.scitotenv.2017.07.200.
15. Togola, A.; Budzinski, H. Multi-residue analysis of pharmaceutical compounds in aqueous samples. *J. Chromatogr. A* **2008**, *1177*, 150–158, doi:10.1016/j.chroma.2007.10.105.
16. López-Serna, R.; Jurado, A.; Vázquez-Suñé, E.; Carrera, J.; Petrović, M.; Barceló, D. Occurrence of 95 pharmaceuticals and transformation products in urban groundwaters underlying the metropolis of Barcelona, Spain. *Environ. Pollut.* **2013**, *174*, 305–315, doi:10.1016/j.envpol.2012.11.022.

17. Gaffney, V.J.; Almeida, C.M.M.; Rodrigues, A.; Ferreira, E.; Benoliel, M.J.; Cardoso, V.V. Occurrence of pharmaceuticals in a water supply system and related human health risk assessment. *Water Res.* **2015**, *72*, 199–208, doi:10.1016/j.watres.2014.10.027.
18. Padhye, L.P.; Yao, H.; Kung'u, F.T.; Huang, C.-H. Year-long evaluation on the occurrence and fate of pharmaceuticals, personal care products, and endocrine disrupting chemicals in an urban drinking water treatment plant. *Water Res.* **2014**, *51*, 266–276, doi:10.1016/j.watres.2013.10.070.
19. Wang, C.; Shi, H.; Adams, C.D.; Gamagedara, S.; Stayton, I.; Timmons, T.; Ma, Y. Investigation of pharmaceuticals in Missouri natural and drinking water using high performance liquid chromatography-tandem mass spectrometry. *Water Res.* **2011**, *45*, 1818–1828, doi:10.1016/j.watres.2010.11.043.
20. Schaider, L.A.; Rudel, R.A.; Ackerman, J.M.; Dunagan, S.C.; Brody, J.G. Pharmaceuticals, perfluorosurfactants, and other organic wastewater compounds in public drinking water wells in a shallow sand and gravel aquifer. *Sci. Total Environ.* **2014**, *468*, 384–393, doi:10.1016/j.scitotenv.2013.08.067.
21. Morasch, B. Occurrence and dynamics of micropollutants in a karst aquifer. *Environ. Pollut.* **2013**, *173*, 133–137, doi:10.1016/j.envpol.2012.10.014.
22. Loraine, G.A.; Pettigrove, M.E. Seasonal Variations in Concentrations of Pharmaceuticals and Personal Care Products in Drinking Water and Reclaimed Wastewater in Southern California. *Environ. Sci. Technol.* **2006**, *40*, 687–695, doi:10.1021/es051380x.
23. Wu, X.-L.; Xiang, L.; Yan, Q.-Y.; Jiang, Y.-N.; Li, Y.-W.; Huang, X.-P.; Li, H.; Cai, Q.-Y.; Mo, C.-H. Distribution and risk assessment of quinolone antibiotics in the soils from organic vegetable farms of a subtropical city, Southern China. *Sci. Total Environ.* **2014**, *487*, 399–406, doi:10.1016/j.scitotenv.2014.04.015.
24. Ho, Y. Bin; Zakaria, M.P.; Latif, P.A.; Saari, N. Occurrence of veterinary antibiotics and progesterone in broiler manure and agricultural soil in Malaysia. *Sci. Total Environ.* **2014**, *488*, 261–267, doi:10.1016/j.scitotenv.2014.04.109.
25. Siedlewicz, G.; Borecka, M.; Białk-Bielirńska, A.; Sikora, K.; Stepnowski, P.; Pazdro, K. Determination of antibiotic residues in southern Baltic Sea sediments using tandem solid-phase extraction and liquid chromatography coupled with tandem mass spectrometry. *Oceanologia* **2016**, *58*, 221–234, doi:10.1016/j.oceano.2016.04.005.
26. Biel-Maeso, M.; Corada-Fernández, C.; Lara-Martín, P.A. Determining the distribution of pharmaceutically active compounds (PhACs) in soils and sediments by pressurized hot water extraction (PHWE). *Chemosphere* **2017**, *185*, 1001–1010, doi:10.1016/j.chemosphere.2017.07.094.
27. Leal, R.M.P.; Figueira, R.F.; Tornisielo, V.L.; Regitano, J.B. Occurrence and sorption of fluoroquinolones in poultry litters and soils from São Paulo State, Brazil. *Sci. Total Environ.* **2012**, *432*, 344–349, doi:10.1016/j.scitotenv.2012.06.002.
28. Kumirska, J.; Migowska, N.; Caban, M.; Łukaszewicz, P.; Stepnowski, P. Simultaneous determination of non-steroidal anti-inflammatory drugs and oestrogenic hormones in environmental solid samples. *Sci. Total Environ.* **2015**, *508*, 498–505, doi:10.1016/j.scitotenv.2014.12.020.
29. Zhao, L.; Dong, Y.H.; Wang, H. Residues of veterinary antibiotics in manures from feedlot livestock in eight provinces of China. *Sci. Total Environ.* **2010**, *408*, 1069–1075, doi:10.1016/j.scitotenv.2009.11.014.
30. Yan, Q.; Gao, X.; Chen, Y.-P.; Peng, X.-Y.; Zhang, Y.-X.; Gan, X.-M.; Zi, C.-F.; Guo, J.-S. Occurrence, fate and ecotoxicological assessment of pharmaceutically active compounds in wastewater and sludge from wastewater treatment plants in Chongqing, the Three Gorges Reservoir Area. *Sci. Total Environ.* **2014**, *470*, 618–630, doi:10.1016/j.scitotenv.2013.09.032.
31. Blair, B.; Nikolaus, A.; Hedman, C.; Klaper, R.; Grundl, T. Evaluating the degradation, sorption, and negative mass balances of pharmaceuticals and personal care products during wastewater treatment. *Chemosphere* **2015**, *134*, 395–401, doi:10.1016/j.chemosphere.2015.04.078.

32. Yuan, S.; Jiang, X.; Xia, X.; Zhang, H.; Zheng, S. Detection, occurrence and fate of 22 psychiatric pharmaceuticals in psychiatric hospital and municipal wastewater treatment plants in Beijing, China. *Chemosphere* **2013**, *90*, 2520–2525, doi:10.1016/j.chemosphere.2012.10.089.
33. Lee, H.-B.; Peart, T.E.; Lewina Svoboda, M.; Backus, S. Occurrence and fate of rosuvastatin, rosuvastatin lactone, and atorvastatin in Canadian sewage and surface water samples. *Chemosphere* **2009**, *77*, 1285–1291, doi:10.1016/j.chemosphere.2009.09.068.