

## Supplementary Materials

**Table S1.** Selected antibiotics and their physico-chemical properties.

Class	Substances/ (CAS Number)	Molar Mass [g/mol]	pK <sub>a</sub>	Log K <sub>ow</sub>	Solubility in water [mg/L]	Half-Life (h) in water
<b>β-Lactam</b>	Amoxicillin (26787-78-0)	C <sub>16</sub> H <sub>19</sub> N <sub>3</sub> O <sub>5</sub> S 365.41	2.4	0.97	3.43	7.2
<b>Macrolides</b>	Erythromycin (114-07-8)	C <sub>37</sub> H <sub>67</sub> NO <sub>13</sub> 733.95	8.88	3.0	1.437	3.5
<b>Fluoroquinolones</b>	Ofloxacin (82419-36-1)	C <sub>18</sub> H <sub>20</sub> FN <sub>3</sub> O <sub>4</sub> 361.38	6.09	-0.2	28.3	9

**Table S2.** Showing studies on the existence of different antibiotic in surface waters.

Antibiotic Compound	Location	Matrix	Detection Method	Concentration (ng/L)	Reference
<b>Amoxicillin</b>	Australia	Surface water	HPLC-MS/MS	200	[26]
	Hong Kong	Surface water	HPLC-MS/MS	76	[27]
	Italy	Surface water	LC-MS/MS	5700	[28]
	Portugal	Surface water	LC-MS/MS	25000	[29]
	Iran	Surface water	LC-MS/MS	80	[30]
	Kenya	Surface water	LC-ESI-MS/ MS	14900	[31]
	South Africa	Surface water	HPLC/MS	800	[32]
<b>Ciprofloxacin</b>	U.S.A	Surface water	HPLC-MS/MS	30	[33]
	Italy	Surface water	LC-MS/MS	103	[15]
	Australia	Surface water	HPLC-MS/MS	1300	[26]
	Brazil	Surface water	HPLC-MS/MS	740	[34]
	Hong Kong	Surface water	HPLC-MS/MS	290	[35]
	China	Surface water	HPLC-MS/MS	7490	[36]
	Serbia	Surface water	HPLC-MS/MS	280	[37]
	India	Surface water	LC-MS/MS	5150	[38]
	Iran	Surface water	LC-MS/MS	1770	[30]
	Spain	Surface water	LC-MS/MS	100	[24]
	Bangladesh	Surface water	LC-MS/MS	1470	[39]
	India	Surface water	HPLC-MS/MS	5750	[40]

Antibiotic Compound	Location	Matrix	Detection Method	Concentration (ng/L)	Reference
<b>Erythromycin</b>	U.K	Surface water	HPLC–ESI-	10	[41]
	India	Surface water	LC-MS/MS	1370	[42]
	Serbia	Surface water	HPLC-MS	60	[43]
	U.K	Surface water	LC-MS/MS	280	[44]
	Taiwan	Surface water	HPLC-MS/MS	34800	[45]
	China	Surface water	LC-MS/MS	230	[46]
	China	Surface water	HPLC-MS/MS	1600	[47]
	China	Surface water	HPLC-MS/MS	2450	[48]
	France	Surface water	UHPLC-MS/MS	2680	[49]
<b>Ofloxacin</b>	Italy	Surface water	HPLC-MS/MS	310	[50]
	France	Surface water	LC-MS/MS	30000	[51]
	Hong Kong	Surface water	HPLC-MS/MS	180	[27]
	India	Surface water	HPLC-MS/MS	15000	[52]
	U.K	Surface water	HPLC-MS/MS	17500	[53]
	Korea	Surface water	HPLC-MS/MS	51000	[45]
	India	Surface water	LC-MS/MS	11800	[38]
	Vietnam	Surface water	LC-MS/MS	5420	[54]
	India	Surface water	UPLC	2050	[9]
	China	Surface water	LC-MS/MS	15600	[55]
<b>Norfloxacin</b>	Switzerland	Surface water	HPLC-MS	45000	[56]
	USA	Surface water	HPLC-MS/MS	80	[57]
	India	Surface water	HPLC-MS/MS	4700	[15]
	Australia	Surface water	HPLC-MS/MS	11500	[58]
	China	Surface water	LC-MS/MS	4290	[59]
	Brazil	Surface water	HPLC-MS/MS	510	[35]
	U.K	Surface water	HPLC-MS/MS	280	[44]
	China	Surface water	LC-MS/MS	4290	[60]
	China	Surface water	HPLC-MS/MS	8340	[61]
	India	Surface water	LC-MS/MS	25100	[38]
	India	Surface water	LC-MS/MS	8910	[62]
	Spain	Surface water	HPLC-MS/MS	90	[63]
<b>Sulfamethoxazole</b>	Germany	Surface waters	HPLC–MS	410000	[64]
	Switzerland	Surface water	HPLC-MS/MS	2800	[65]
	USA	Surface water	HPLC-MS/MS	4500	[66]
	Australia	Surface water	HPLC-MS/MS	20	[58]
	Sweden	Surface water	LC-MS/MS	2330	[67]
	Brazil	Surface water	LC-MS/MS	10	[68]
	Portugal	Surface water	HPLC-MS/MS	4300	[69]
	Bangladesh	Surface water	LC-MS/MS	9090	[70]
	Sweden	Surface water	HPLC-MS/MS	2330	[71]
	USA	Surface water	LC-MS/MS	9650	[72]
	Vietnam	Surface water	LC-MS/MS	5850	[54]
	Kenya	Surface water	LC-MS/MS	6800	[73]
	Poland	Surface water	UHPLC-MS	7880	[74]

Antibiotic Compound	Location	Matrix	Detection Method	Concentration (ng/L)	Reference
<b>Naproxen</b>	Switzerland	Surface water	GC–MS	10000	[75]
	Serbia	Surface water	HPLC-MS/MS	7400	[37]
	China	Surface water	LC-MS/MS	3500	[76]
	Portugal	Surface water	HPLC-MS/MS	2600	[77]
	South Africa	Surface water	LC-MS/MS	5930	[78]
<b>Carbamazepine</b>	Switzerland	Surface water	LC-MS/MS	35000	[75]
	U.K	Surface water	LC-MS/MS	2560	[79]
	Serbia	Surface water	HPLC-MS/MS	8700	[37]
	China	Surface water	HPLC-MS/MS	21500	[80]
	China	Surface water	LC-MS/MS	1150	[76]
	Portugal	Surface water	LC-MS/MS	4300	[69]
	Bangladesh	Surface water	LC-MS/MS	880	[81]
	USA	Surface water	LC-MS/MS	170	[82]
	Korea	Surface water	LC-MS/MS	40	[83]
	Spain	Surface water	HPLC-MS/MS	260	[63]
<b>Sulfadiazine</b>	Denmark	Surface water	LC-MS-MS	480	[84]
	U.K	Surface water	HPLC-MS/MS	4130	[79]
	China	Surface water	LC-MS/MS	1390	[85]
	China	Surface water	HPLC-MS/MS	260	[60]
	USA	Surface water	LC-MS/MS	250	[86]
	Vietnam	Surface water	ESI-LCMS/MS	450	[87]
	China	Surface water	HPLC-MS/MS	520	[88]
<b>Chlortetracycline</b>	U.S.A	Surface water	GC–MS/MS	6900	[89]
	China	Surface water	RPLC-MS/MS	1220	[90]
	Spain	Surface water	LC-MS/MS	50	[63]
<b>Lincomycin</b>	U.S.A	Surface water	GC–MS/MS	7300	[89]
	Korea	Surface water	LC-MS/MS	4840	[45]
	Vietnam	Surface water	LC-MS/MS	1160	[54]
	Spain	Surface water	HPLC-MS/MS	110	[63]
<b>Roxithromycin</b>	China	Surface water	LC-MS/MS	8840	[60]
	Sweden	Surface water	HPLC-MS/MS	130	[70]
<b>Trimethoprim</b>	Denmark	Surface water	LC-MS-MS	550	[84]
	U.K	Surface water	HPLC/MS	1080	[79]
	Serbia	Surface water	HPLC/MS	810	[37]
	China	Surface water	LC-MS/MS	1560	[76]
	Vietnam	Surface water	ESI-LC-MS/MS	170	[91]
	Cyprus	Surface water	LC-MS/MS	1300	[92]
	India	Surface water	LC-ESI-MS/MS	120	[31]
	Spain	Surface water	HPLC/MS	720	[63]

Antibiotic Compound	Location	Matrix	Detection Method	Concentration (ng/L)	Reference
<b>Enrofloxacin</b>	USA	Surface water	HPLC-MS/MS	120	[93]
	Australia	Surface water	HPLC-MS/MS	3000	[58]
	China	Surface water	LC-MS/MS	270	[59]
	China	Surface water	HPLC-MS/MS	8770	[36]
	Vietnam	Surface water	ESI-LC-MS/MS	1400	[86]
	India	Surface water	LCMS/MS	1810	[38]
	China	Surface water	LC-MS/MS	450	[94]
<b>Clarithromycin</b>	Italy	Surface water	HPLC-MS/MS	3200	[57]
	Italy	Surface water	HPLC-MS/MS	2300	[50]
	Switzerland	Surface water	HPLC-MS/MS	140	[95]
	Serbia	Surface water	HPLC-MS/MS	6160	[37]
	China	Surface water	HPLC-MS/MS	1230	[80]
	Portugal	Surface water	HPLC-MS/MS	2680	[77]
	Bangladesh	Surface water	UPLC-MS/MS	9090	[96]
	Portugal	Surface water	HPLC-MS/MS	94900	[97]