Electronic Supplementary Information

The degradation behaviour of nine diverse contaminants in urban surface water and wastewater prior to water treatment

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Contents

S1. The maintenance of oxic conditions

Preliminary observations have showed that in conditions similar to the ones of the degradation assays used here, bubbling air through each bottle 60 minutes per day would progressively evaporate water, which would lead to an increase in concentration in the absence of degradation or water-refilling. Our measured concentration of atrazine were increasing within time and the concentration of E2 were stable while we were expecting it to decrease (through degradation). This effect was not important on a short period but was noticeable for longer periods (few weeks). A correction factor has hence been used to correct the quantified concentrations of the target compounds, to prevent them being biased to high due to water evaporation. We note that volatilization is not an issue for the studied compounds, due to their low Henry's law constant (Table 2 in the main text), which warrants their classification as being non-volatile from water. The correction factor was used every time we were analyzing the target compounds in the degradation assays and can be summarised as follows:

$$[C]_r = \gamma\,[C]_m$$

Where

- $[C]_r$ is the real concentration of the compound in µg L^{-1}
- $[C]_m$ is the concentration measured by the analytical technique in µg L-1
- γ is the correction factor

$$m_{Tn} = M_{Tn} - v \qquad \gamma = \frac{m_{Tn} + (0.5(n+1))}{m_{To}}$$

Where

- m_{Tn} is the mass of the matrix in mg after the withdrawal of the aliquot at T_n
- M_{Tn} is the sum of the mass of the bottle and the matrix in mg after the withdrawal of the aliquot at T_n
- v is the mass of the empty bottle in mg
- $(0.5(n+1))$ is the correction on m_{Tn} for the taken aliquot of 0.5 mg (500 µL) at every T_n

S2. Viability of the microbial composition of the raw wastewater systems in time

The microbial lag phase is the period of time in which the bacterial population of a system adapts itself to the biodegradable compound(s). During this period, no biodegradation is observed. The OECD standardised protocol (309 – simulation biodegradation test) that was followed states that a system is not considered viable in terms of active bacterium if the lag phase exceeds 60 days and no biodegradation is observed until 90 days, in which case the studied system has depleted and a renewal is necessary to continue the studies. The results of the laboratory bench-scale experiment measuring the biological degradation of the target compounds in raw wastewaters showed that the studied raw wastewaters were microbiologically viable during all the duration of the biodegradation experiment, the biodegradation starting no later than the 71th day.

A measurement of the viable bacterium in the studied raw wastewaters at the 38th day also supports this conclusion (Table S1).

Table S1. Bacterial count in the studied raw wastewaters initially and after 38 days of incubation.

Raw wastewater	T_0	T = 38 days of biodegradation experiment	
	viable bacteria (nb/L)	viable bacteria (nb/L)	total bacteria (nb/L)
4 °C	2.09 x10^{10}	2.99 x10^{9}	1.01 x10^{10}
21.5 °C	2.09 x10^{10}	6.94 x10^{9}	1.13 x10^{10}

S3. Results of potential long term compound losses by adsorption on vessels

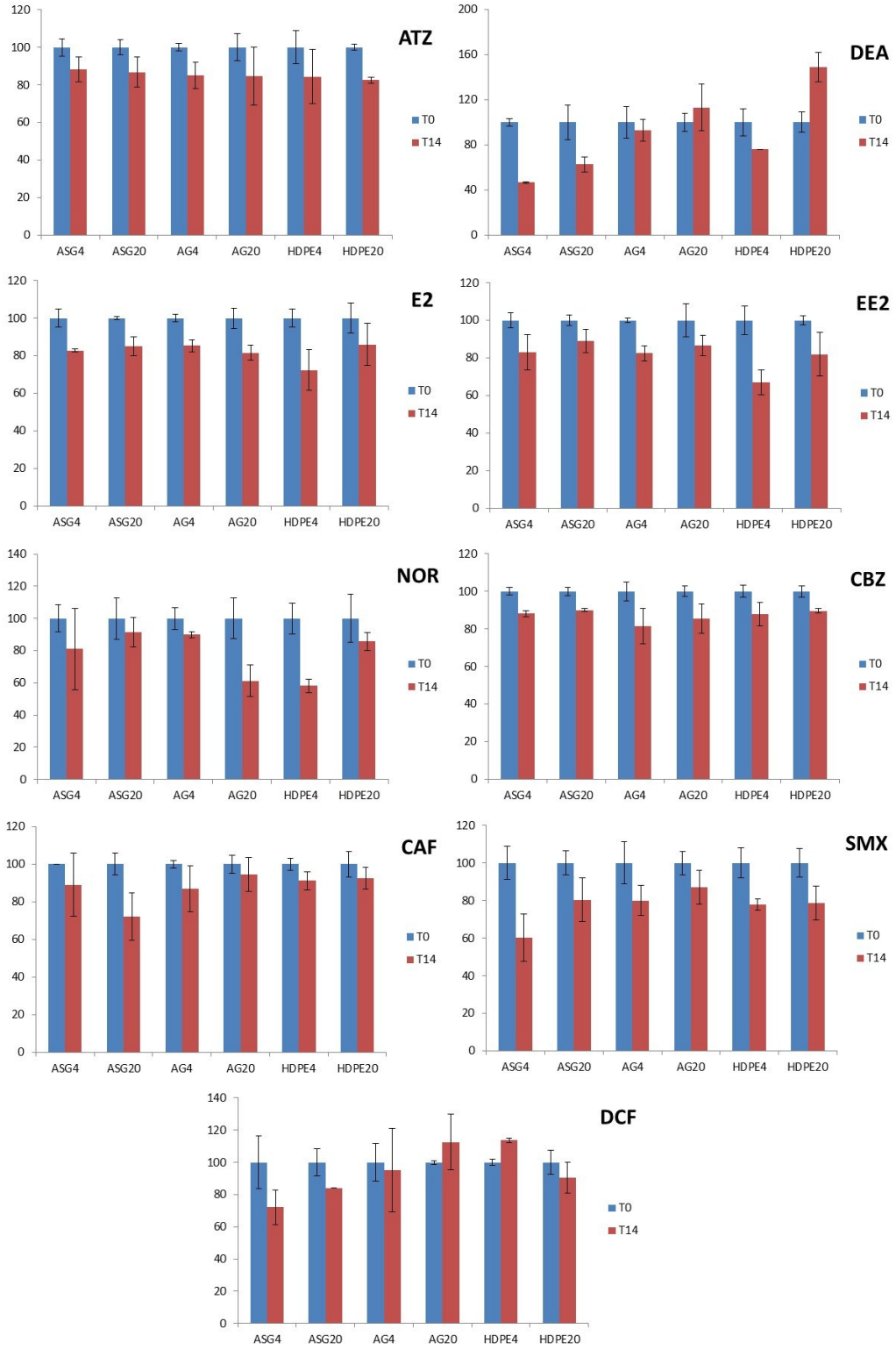

Figure S1. Compound losses by sorption on internal bottle surface after 14 days of incubation at 4 and 20 °C for an initial concentration of ≈400 µg L^{-1} in distilled water where ASG = amber silanized glass bottle, AGB = amber glass bottle & HDPE = HDPE bottles.

S4. Influence of biocides on the analytical variability

A comparison was made between a sample of raw wastewater and a sample of acidified (pH 4.5) wastewater spiked with 150 µm of 150 µM of CuSO4 and AgNO3 to investigate if the conditions of the sample with biocides influenced the variability of the analysis of the 9 target compounds.

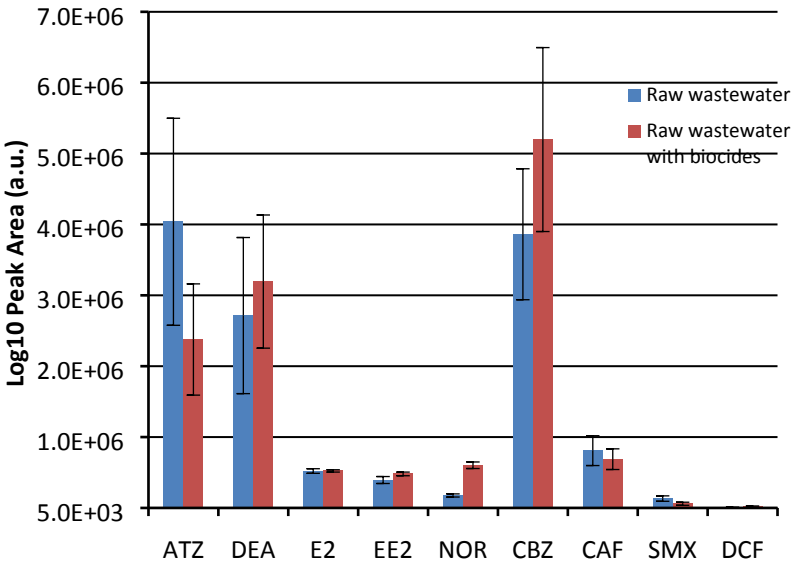

Figure S2. Log_{10} peak area (a.u.) of the nine target compounds at 400 µg L^{-1} ± SD (n=5) in raw wastewater and in acidified (with formic acid) wastewater spiked with 150 µM of $CuSO_4$ and $AgNO_3$.

The results **(Figure S2)** showed that the new conditions did not change the peak areas for ATZ, DEA, CBZ, E2, EE2 and CAF, these peak areas being not statistically different from raw to wastewater pH 4.5 with biocides. The acidification and the addition of biocides respectively tripled and doubled the peak areas of NOR and DCF, which should not affect the variability of their signal. The peak area decreased only for SMX, the signal passing from 10^5 to 10^4 when acidifying and adding biocides. The latter signal being quite low, this may influence the variability of the signal. The response ratio is defined by the ratio of the peak area of the target compound on the peak area of its internal standard. Since it is the parameter used to quantify the compounds, the influence of the acidification and the addition of biocides on it was also measured.

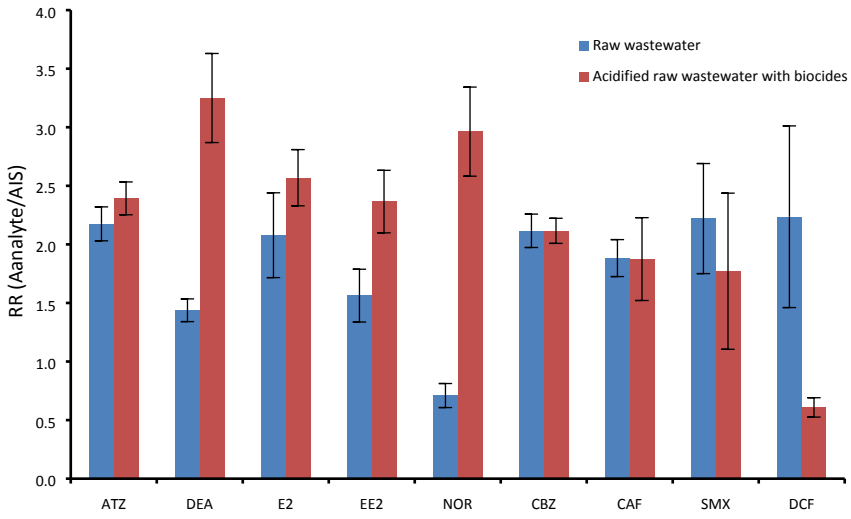

Figure S3. Response Ratio (RR) of the 9 target compounds at 400 µg L^{-1} ± SD (n=5) in raw wastewater and in acidified (with formic acid) wastewater spiked with 150 µM of $CuSO_4$ and $AgNO_3$.

Results (**Figure S3**) showed that the response ratios of DEA, EE2, NOR and DCF are statistically different when acidifying and adding biocides, which means that a calibration curve per condition (one for samples of raw wastewater and one for wastewater pH 4.5 + biocides) had to be done before each quantification. Results also showed that the acidification and addition of biocides did not affected the quantification of SMX, the RRs being statistically identical. The standard deviations of the RRs of the acidified wastewater samples spiked with biocides were deemed acceptable.

S5. Parameters of the analytical method

Table S2 LDTD parameters for the quantification of 9 target analytes in Positive (+) Ionization Mode by LDTD-APCI-MS/MS

LDTD Method Caracteristics[A]	
Laser power at 980 nm & 20 W	0.30
Laser pattern	2 sec at 0% 1 sec from 0 to 30% 0.01 sec from 30% to 0%
Capillary temperature	50 °C
Carrier gas flow	3.0 L min^{-1}
Ion sweep gas	0.3 a.u.
Sheath gas	0
Auxiliary gas	0
Skimmer offset	0
Vaporizer temperature	0

[A]All the methods have the same characteristics: there are 4 because the LDTD system cannot take more than 8 transitions (4 compounds) at the same time

Table S3 LDTD methods and internal standards associated for the quantification of target compounds by LDTD-APCI-MS/MS

LDTD Method[A] (#)	Compound	Internal Standard
1	ATZ	$[^{13}C_3]$-ATZ
	DEA	
2	E2	$[^{13}C_6]$-E2
	EE2	
	NOR	
3	CBZ	CBZ-d_{10}
	CAF	$[^{13}C_3]$-CAF
4	SMX	$[^{13}C_6]$-SMX
	DCF	DCF-d_4

[A]All the methods have the same characteristics: there are 4 because the LDTD system cannot handle more than 8 transitions (4 compounds) simultaneously (i.e. one injection peak lasts only for a few seconds at most).

Table S4 MS/MS parameters for the quantification of 9 target analytes in positive (+) ionization mode by LDTD-APCI-MS/MS

Compound	Ionisation mode	Precursor Ion $[M+H]^+$ (m/z)	Product Ion (m/z)	TL (V)	CE (eV)
ATZ	(+)	216.12	131.9 173.9	70	23
DEA	(+)	188.1	103.9 145.9	60	27
E2	(+)	255.18	133.1 159.1	70	18
EE2	(+)	279.1	133.1 159.1	55	18
NOR	(+)	299.205	109.1 91.1	89	39
CBZ	(+)	237.12	192.1 194.1	65	24
CAF	(+)	195.12	109.9 137.9	69	21
SMX	(+)	254.06	107.9 156.1	55	24
DCF	(+)	296.01	215.0 249.9	63	12
$[^{13}C_3]$-AT	(+)	219.11	106.0 177.0	71	30
$[^{13}C_6]$-E2	(+)	261.18	133.1 159.0	73	20
CBZ-d_{10}	(+)	247.17	202.1 204.1	72	36
$[^{13}C_3]$-CAF	(+)	198.111	112.1 140.1	72	24
$[^{13}C_6]$-SMX	(+)	260.081	114.1 162.0	61	22
DCF-d_4	(+)	300.26	219.1 254.1	69	21

S6. Quality assurance and validation of the analytical method

Table S5 Replicability and recovery for the wastewaters tested for an added concentration of 200 µg L^{-1} (n = 5)*

Compound	Replicability			Recovery		
	Amount found [µg L^{-1}]	SD (µg L^{-1})	RSD (%)	Amount found [µg L^{-1}]	% Bias vs amount spiked	% vs amount spiked
ATZ	198	7,6	3,8	198	-0.8	99.2
DEA	164	11,2	6,8	168	-15.9	84.1
E2	205	15,7	7,7	164	-18.1	81.9
EE2	201	20,5	10,2	208	4.0	104
NOR	193	26,9	14,0	167	-16.5	83.5
CBZ	210	18,7	8,9	172	-14.2	85.8
CAF	192	30,5	15,8	228	14.0	114
SMX	173	28,3	16,3	251	25.3	125
DCF	193	39,8	20,7	206	3.2	103

*Test were carried out separately with 2 different samples.

The replicability of the method describes the agreement of a set of results among themselves when the analyst, the instrument and the day of analysis is the same. It was tested in the dirtiest studied water, i.e. the raw wastewater (PST effluent). There are many ways to calculate the replicability. The relative standard deviation (RSD) was considered for the present study (n=5). The acceptance threshold was fixed at 15% of RSD.

The results suggested that 3 (CAF, SMX and DCF) of the 9 studied compounds did not respect the acceptance threshold of ≤ 15%. Nonetheless, the respective values of 15.8, 16.3 and 20.7 for CAF, SMX and DCF were deemed satisfactory since like in any analysis, it is possible to exclude outliers. The goal of this test was to show that the method was replicable and not to develop a robust analytical method. Precise exclusion procedures were created for series of data which values were exceeding the acceptance threshold. These exclusion procedures were applied during all the degradation tests, without exception. An observation was deemed an outlier if it failed the Q test. Furthermore, when the RSD was > 15% within a series of data, the value increasing the most the RSD was excluded, with a maximum of 1 data that can be excluded. Unlike all the other studied compounds which were quantified with 3 wells per sample, SMX and DCF were quantified with 5 wells to mitigate the lower replicability of their analysis.

Table S6 Method limits of detection (LOD) and limits of quantification (LOQ) for the 9 target analytes in the aqueous systems tested

Compound	LOD [µg L^{-1}]	LOQ [µg L^{-1}]	LOD [µg L^{-1}]	LOQ [µg L^{-1}]	LOD [µg L^{-1}]	LOQ [µg L^{-1}]
	dd-water		0.45 µm surface river water		(raw wastewater)	
ATZ	3.7	12.2	3.7	12.2	4.0	13.2
DEA	1.0	3.3	1.0	3.3	3.0	9.9
E2	0.7	2.3	0.7	2.3	5.0	16.5
EE2	0.3	1.1	0.7	2.3	2.5	8.3
NOR	0.3	0.9	0.3	0.9	3.0	9.9
CAF	1.9	6.3	3.1	10.2	10.0	33.0
CBZ	0.2	0.5	0.2	0.5	0.4	1.3
SMX	1.0	3.3	2.2	7.3	6.7	22.1
DCF	2.5	8.3	1.3	4.3	7.2	23.8

S7. Degradation results

Table S7 Exhaustive degradation results: Lag phases (Lp), pseudo first order disappearance rate constants (*k*) & half-lives ($t_{1/2}$) ± standard deviation of duplicate incubations for the nine target compound in all conditions studied.

Compound	Water type tested	0.45 µm filtered urban river (surface water)		Raw wastewater (PST outlet)			
	Characteristics of the incubation	4°C	21°C	4°C with biocides	4°C	21.5°C with biocides	21.5°C
ATZ	-	*a*	*a*	*d*	*d*	*d*	*d*
DEA	-	*a*	*a*	*d*	*d*	*d*	*d*
E2	Lp [days]	*d*	5 ≤ Lp < 14	*d*	2 ≤ Lp < 8	2 ≤ Lp < 43	non significant
	k [days^{-1}]		0.128 ± 0.003		0.018 ± 0.004	*f*	0.52 ± 0.01
	$t_{1/2}$ [days]		5.4 ± 0.1		40 ± 9		1.30 ± 0.03
EE2	Lp [days]	*a*	*a*	*d*	*d*	*d*	26 ≤ Lp < 66
	k [days^{-1}]						0.036 ± 0.003
	$t_{1/2}$ [days]						19 ± 2
NOR	Lp [days]	*b*	*b*	*e*	8.5 ≤ Lp < 21.5	*e*	0 ≤ Lp < 8.5
	k [days^{-1}]				0.022 ± 0.002		0.11 ± 0.00
	$t_{1/2}$ [days]				32 ± 4		6 ± 0
CBZ	-	*a*	*a*	*e*	*e*	*e*	*e*
CAF	Lp [days]	*a*	*a*	*c*	0 ≤ Lp <8.5	*c*	0 ≤ Lp <8.5
	k [days^{-1}]				0.011 ± 0.003		0.037 ± 0.004
	$t_{1/2}$ [days]				65 ± 20		19 ± 2
SMX	Lp [days]	*a*	*a*	*c*	21.5 ≤ Lp < 71	*c*	0 ≤ Lp < 8.5
	k [days^{-1}]				0.0082 ± 0.0008		0.035 ± 0.003
	$t_{1/2}$ [days]				85 ± 8		20 ± 2
DCF	-	*a*	*a*	*e*	*e*	*e*	*e*

No significant disappearance observed after [a]365, [b]156, [c]130, [d]72 or [e]66 days (experiment length).
[f] data excluded due to poor reproductibility.

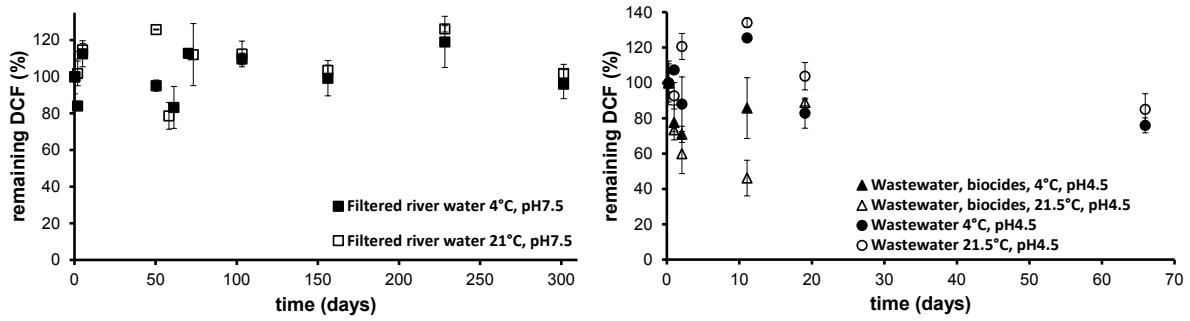

Figure S4. Residual Diclofenac (%) over time (days) in a raw wastewater (PST outlet) with an initial spiked concentration of 400 µg L^{-1}. Error bars represent relative standard deviation of duplicates measurements.

S8. Literature Review of Aquatic Degradation Data for the Studied Compounds

Table S8 Reported values of degradation for the 9 studied compounds in different water systems[a]

Compound (ref)	Studied system		System characteristics	$t_{1/2}$ (days)	Degradation % in (time)	Implied process
ATZ[2]	Anaerobic mixed growth medium		dextrose as $C_{external}$ source		40 (5d)	B
ATZ[2]			ø $C_{external}$ source	n.a.	61.8 (34d)	B
ATZ[2]			ø C & $N_{external}$ source		42 (150d)	B
ATZ[2]	Aerobic *Agrobacterium radiobacter* growth medium (common soil bacterium)		n.a.	n.a.	94 (72h)	B
ATZ[3]	Aerobic river sediments	water	0.8% C_{org}	20	n.a.	B, H, O
ATZ[3]		water:sediment (extractible)		80		B, H, O
ATZ[3]	Aerobic pond sediments	eau	5% C_{org}	14		B, H, O
ATZ[3]		water:sediment (extractible)		35		B, H, O
ATZ[3]	Aerobic water downstream of a sugar refinery	500 ml water : 12.5 g sediments	10 ppm sugar at 22°C	n.a.	100 (6w)	B
ATZ[3]	Aerobic distilled water		at 22°C		100 (18w)	B
ATZ[3]	Anaerobic pond water	50 ml water : 25 g sediments	n.a.	608	n.a.	G
ATZ[3]	Saltwater	n.a.	n.a.	15-20	n.a.	G
ATZ[3]	Sterile buffered water		ph 5	1000	n.a.	H
ATZ[3]			ph 7	none		H
ATZ[3]			ph 9	6600		H
ATZ[3]			ø photo-sensitizer	≈335	n.a.	P
ATZ[3]			with photo-sensitizer	<<< 335	n.a.	P
ATZ[4]	EU Method C.7 (Degradation: Abiotic Degradation: H as a Function of ph)		ATZ 1500 ppb, ph 5, 25ºC	69.6	n.a.	H
ATZ[4]			ATZ 1500 ppb, ph 5, 60ºC	6.6	n.a.	H
ATZ[4]			ATZ 1500 ppb, ph 5, 70ºC	3.7	n.a.	H
ATZ[5]	Synthetic river water, ph 6.4 (aerobic)		ATZ 500 ppb, reactor operated in continuous mode	none	n.a.	B
ATZ[5]	Synthetic river water , ph 6.4 (anaerobic)			none	n.a.	B

ATZ[6]			0.02M phosphate buffer (sterile)	17-57% (1w); the amounts of dealkylated metabolites generally did not exceed those of sterile solutions. The results indicate that atrazine is not degraded by bacteria but bound, thus simulating B.		C
ATZ[6]	Media enriched (ph 7.2) with mixed bacterial populations from		soil			B
ATZ[6]			water			B
ATZ[6]			activated sludge			B
ATZ[7]	Estuarine water	water	aerobic, natural light	3-12	n.a.	P
ATZ[7]		sediments		15-20		P
ATZ[8]	Aqueous systems	waters in general	n.a.	>>365	n.a.	P
ATZ[9]	Aqueous system		ph 7.0, natural light	335	n.a.	P
ATZ[9]	Autoclaved estuarine and marine water		n.a.	n.a.	persistent (128d)	C
ATZ[9]	River water		n.a.	n.a.	17% (128d)	G
ATZ[9]	Field or microcosm evaluations		River estuary surrounded by an agricultural watershed (corn)	30	n.a.	G
ATZ[9]			Estuarine conditions	30	n.a.	G
ATZ[9]			Estuarine microcosm (river surrounded by an agricultural watershed (corn)	90-120	n.a.	G
ATZ[9]			Estuarine microcosm (river surrounded by an agricultural watershed (corn)	90-120	n.a.	G
ATZ[9]	[9]Laboratory aqueous Systems		25 ˚C, ph 4	244	n.a.	H
ATZ[9]			25 ˚C, ph 4, 2% humic acid	1.73	n.a.	H
ATZ[9]			ph 2.9, 5 mg/L fulvic acid	34.8	n.a.	H
ATZ[9]			ph 4.5, 5 mg/L fulvic acid	174	n.a.	H
ATZ[9]			ph 6.0, 5 mg/L fulvic acid	398	n.a.	H
ATZ[9]			ph 7.0, 5 mg/L fulvic acid	742	n.a.	H
ATZ[9]			ph 5.0-7.0	n.a.	persistent (30d)	H
DEA[10]	Potable water	n.a.	n.a.	n.a.	persistent (10d)	G
DEA[11]	Groundwater microcosm under low O_2 conditions		DEA~20 µg/L, DO <3.0 mg/L	n.a.	persistent (45d)	G
DEA[12]	Aerobic aquifer		DEA~3 µg/L, DO~6.9 mg/L	n.a.	persistent (60d)	G
E2[13]	Aerobic digestion unit	mud		n.a.	88 (24h)	B

E2[13]	Anaerobic digestion unit	mud		7	n.a.	B
E2[13]	Bioreactor	n.a.		n.a.	92 (7h) & 100 (49h)	B
E2[14]	Aerobic river water		20 °C	n.a.	100 (1.2d)	B
EE2[14]					17 (1.2d)	B
E2[15]	Aerobic marine water		20 °C	complete degradation in 14d after a 28d lag phase		B
EE2[15]						B
E2[15]	Anaerobic marine water			none	n.a.	B
EE2[15]						B
E2[14]	Aerobic industrial, urban and rural waters		pH 7.1-8.4, DOC 2.9-10.3 mg/L, TSS 5.2-83 mg/L, bacterium $3x10^6$-$3.5x10^8$ cfu/L, 20 °C	0.2-9	n.a.	B
EE2[14]				more persistent than E2		B
E2/EE2[14]				5	n.a.	P
E2/EE2[14]			sterile	none	persistent (16d)	H + O
E2[16]	English river waters		Water column, initialy aerobic but potentially decreasing oxic conditions, 20 °C	2-3	n.a.	B
EE2[16]				4-6		B
E2/EE2[16]			sterile	none	persistent	H + O
E2[17]	Potable water		n.a.	n.a.	38.9 (10d)	G
EE2[17]					22.4 (10d)	G
E2[18]	Japanese river waters		15 °C (winter)	n.a.	100 (7d)	B
E2[18]			28 °C (summer)	n.a.	100 (5d)	B
EE2[18]			15 °C (winter)	>>14	n.a.	B
EE2[18]			28 °C (summer)	14	n.a.	B
E2/EE2[18]			sterile	none	persistent (5d)	H + O
CBZ[19]	Aquatic microcosm of 12,000 L held outside		unspecified T(°C) and O_2 – communities of fish, aquatic plant, zoo-, phytoplankton, macrophyte & bacterium	n.a.	not significant	H
CBZ[19]				n.a.	not significant	B
CBZ[19]				82	n.a.	P
CBZ[20]	Stream muddy water (oxic, darkness, 20˚C)	water	pH 8,5, TOC 4,7 mg/L	47	n.a.	B
CBZ[20]		3 water : 1 sediment	pH 7,7, 1.4% C_{org},	328		B
CBZ[21]	Double-distilled water		naturally irradiated in spring, 40°N, pH 5,5 at 25 °C	5.1	n.a.	P

CBZ[22]	Double-distilled water	naturally irradiated in winter, 40°N, pH 5,5 at 25 °C	100	n.a.	P
CBZ[23]	11 australian wastewaters (primary settling tanks, activated sludge, anaerobic digestion)	bacterial beds aged between 1 and 40 days, oxic and anoxic conditions	n.a.	not significant during treatment	B
CBZ[24]	Aqueous systems (Estimation Program Interface)	pH 5 at 25˚C	> 365	n.a.	H
CBZ[24]		pH 7 at 25˚C	> 365		H
CBZ[24]		pH 9 at 25˚C	> 365		H
CAF[19]	Aquatic microcosm of 12,000 L held outside	unspecified T(°C) and O_2 – communities of fish, aquatic plant, zoo-, phytoplankton, macrophyte & bacterium	n.a.	not significant	H
CAF[19]			n.a.	not significant	B
CAF[19]			1-2	n.a.	P
CAF[25]	Lake water	sterile (darkness) at 20°C	nulle	persistent	H + O
CAF[25]		sterile at 20°C	12.8	n.a.	P
CAF[25]		natural (darkness) at 20°C	>120	n.a.	B
CAF[25]		natural at 20°C	12	n.a.	P + B
CAF[26]	WWTP primary inlet	BOD 67 mg/L, TSS 76 mg/L, pH 7, 19 °C	~1	≈100 (3d)	B
CAF[26]	WWTP outlet	BOD 3.6 mg/L, TSS 7.9 mg/L, pH 6.4, 19 °C	~5	≈100 (10d)	B
CAF[27]	Sediments upstream of 3 WWTP	oxic, 23 °C	n.a.	20-90 (2d)	B
CAF[27]		anoxic, 23 °C		85-98 (32d)	B
CAF[27]	Waters upstream of 2 WWTP	oxic, 23 °C	none	not significant	B
CAF[27]	Water upstream of a WWTP		n.a.	100 (46d)	B
CAF[24]	Aqueous systems (Estimation Program Interface)	pH 5 at 25˚C	30-500	n.a.	H
CAF[24]		pH 7 at 25˚C	30-500		H
CAF[24]		pH 9 at 25˚C	1-70		H
SMX[19]	Aquatic microcosm of 12,000 L held outside	unspecified T(°C) and O_2– communities of fish, aquatic plant, zoo-, phytoplankton, macrophyte & bacterium	n.a.	not significant	H
SMX[19]			n.a.	not significant	B
SMX[19]			19	n.a.	P

SMX[26]	WWTP primary inlet	BOD 67 mg/L, TSS 76 mg/L, pH 7, 19 °C	~18.	90 (25d)	B
SMX[26]	WWTP outlet	BOD 3.6 mg/L, TSS 7.9 mg/L, pH 6.4, 19 °C	none	persistent (56d)	B
SMX[28]	Synthetic system, 3 water : 1 sediment	unspecified O_2, 25 °C	14	n.a.	B
SMX[28]		sterile, 25 °C	115		B
SNX[29]	Natural waters (initial O_2 of 7.8 mg/L, no air bubbling and no bottle headspace)	sterile (darkness)	none	persistent	H
SMX[29]		sterile	48.9		P
SMX[29]		natural (darkness)	47.4	n.a.	B
SMX[29]		natural	7.3		B + P
SMX[29]	Sediment slurry (4.7% C_{org})	sterile (darkness)	none	persistent	H
SMX[29]		sterile	47.3		P
SMX[29]		natural (darkness)	10.1	n.a.	B
SMX[29]		natural	4.9		B + P
SMX[22]	Double-distilled water	natural irradiation in winter, 50°N, pH 5,5	2.4	n.a.	P
DCF[22]	Double-distilled water	natural irradiation in winter, 50°N, pH 5,5	5	n.a.	P
DCF[30]	Liquid phases of WWTP sludges (0.5 g TSS/L)	sterile	n.a.	persistent	H
DCF[30]		aerobic, pH 5.5-7.3, 20˚C	n.a.	persistent	B
DCF[31]	Aerobic synthetic wastewater	(10 mg activated sludge/L deionized water)	none	persistent (28d)	B
DCF[32]	Lake surface waters	n.a.	n.a.	90 (1h)	P
DCF[32]		darkness	none	persistent (37d)	H + B

[a] Classification symbols are h = hours, d = days, w = weeks, B = biodegradation, H = hydrolysis, O = oxidation, G = general degradation, P = photolysis and C = chemical degradation

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