

## Different approaches for estimation of expanded uncertainty of an analytical method developed for determining pharmaceutical active compounds in wastewater using solid-phase extraction and liquid chromatography coupled with tandem mass spectrometry method

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**Table S1.** Preliminary concentration range for the study of PhACs linearity and respective instrumental analytical thresholds

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F (0,05; 1; N-3)	LOD µg/L	LOQ µg/L
ATN	24	0.4 – 749	0.9958	10.3	[93-134]	[-94; 17]	[82-118]	131.7 ≥ 4.3	44.5	148.5
APAP	24	0.3 – 717	0.9697	28.9	[100-302]	[-96; 44]	[45-137]	136.2 ≥ 4.3	114.4	381.4
SDZ	24	0.4 – 734	0.9972	8.5	[92-157]	[-93; 15]	[74-126]	104.8 ≥ 4.3	35.9	119.5
SPD	24	0.4 – 739	0.9936	12.7	[99-176]	[-95; 22]	[70-123]	72.9 ≥ 4.3	54.1	180.3
CAF	24	0.4 – 744	0.9979	7.3	[76-118]	[-97; 10]	[87-135]	138.3 ≥ 4.3	31.5	104.9
SMX	24	0.4 – 735	0.9994	3.8	[90-102]	[-85; 5]	[95-109]	27.3 ≥ 4.3	16.2	54.1
MTPL	24	0.4 – 728	0.9924	13.9	[89-142]	[-95; 20]	[75-121]	259.1 ≥ 4.3	58.2	194.2
PPNL	24	0.4 – 714	0.9943	12.0	[90-127]	[-96; 18]	[80-112]	173.7 ≥ 4.3	49.4	164.7
CTS	24	0.4 – 744	0.9968	8.9	[83-127]	[-93; 12]	[84-129]	255.7 ≥ 4.3	38.5	128.2
CBZ	24	0.4 – 730	0.9939	12.5	[93-144]	[-95; 17]	[74-115]	353.2 ≥ 4.3	52.4	174.7
CFA	19	3.3 – 722	0.9989	4.5	[92-115]	[-11703;400]	[91-113]	123.9 ≥ 4.5	23.8	79.2
NPX	24	0.4 – 717	0.9968	9.0	[74-118]	[-93; 39]	[84-106]	49.1 ≥ 4.3	37.1	123.6
GTD	22	1.6 – 731	0.9960	9.5	[96-118]	[-78; 118]	[82-115]	401.8 ≥ 4.4	43.7	145.8
TTE	23	0.6 – 753	0.9983	6.3	[84-120]	[-85; 118]	[88-124]	74.2 ≥ 4.4	28.7	95.5
BZF	24	0.4 – 665	0.9997	3.1	[91-115]	[-533; 2442]	[87-108]	0.0 ≥ 4.3	10.9	36.4
IBUP	22	0.6 – 646	0.9978	7.3	[81-103]	[-11; 83]	[89-111]	1.8 ≤ 4.4	27.2	90.7
DCF	24	0.4 – 687	0.9951	11.7	[94-138]	[-95; 16]	[77-110]	321.2 ≥ 4.3	42.4	141.3
E3	22	0.6 – 603	0.9989	5.2	[91-113]	[-9; 120]	[89-110]	0.01 ≤ 4.4	18.0	60.1
E1	22	0.6 – 610	0.9985	6.2	[98-121]	[-82; 7]	[88-109]	38.8 ≥ 4.4	21.8	72.5
E2	22	0.6 – 603	0.9971	8.5	[97-148]	[-86; 7]	[78-119]	104.5 ≥ 4.4	29.4	98.0
EE2	21	1.6 – 605	0.9980	6.9	[82-135]	[-74; 14]	[81-134]	135.0 ≥ 4.4	24.9	83.0
DES	22	0.6 – 611	0.9946	11.6	[89-128]	[-89; 11]	[80-115]	19.3 ≥ 4.4	40.8	136.0
ERT	19	0.4 – 643	0.9862	22.4	[31-526]	[-93; 24]	[11-180]	39.1 ≥ 4.5	63.0	210.1
FLX	21	0.4 – 655	0.9980	7.5	[49-154]	[-451; 617]	[43-136]	52.2 ≥ 4.4	23.6	78.8

**Table S2.** PhACs linearity range studies and respective instrumental analytical thresholds – low concentration range

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F (0,05; 1; N- 3)	LOD µg/L	LOQ µg/L
ATN	8	1.5 – 9.2	0.9998	0.76	[98-107]	[-0.9; 1.2]	[97-106]	0.16 ≤ 6.61	0.11	0.37
APAP	8	1.6 – 9.6	0.9995	1.36	[98-107]	[-3.0; 4.5]	[96-105]	1.99 ≤ 6.61	0.20	0.68
SDZ	8	1.6 – 9.4	0.9992	1.73	[95-104]	[-2.7; 1.9]	[96-105]	1.25 ≤ 6.61	0.25	0.84
SPD	8	1.5 – 9.2	0.9994	1.50	[95-106]	[-4.0; 1.4]	[95-106]	1.11 ≤ 6.61	0.22	0.72
CAF	8	1.6 – 9.4	0.9993	1.58	[96-100]	[-1.6; 4.0]	[98-103]	4.15 ≤ 6.61	0.23	0.78
SMX	8	1.6 – 9.6	0.9987	2.18	[96-101]	[-2.0; 2.2]	[97-102]	0.79 ≤ 6.61	0.33	1.09
MTPL	8	1.6 – 9.4	0.9984	2.38	[96-111]	[-3.2; 5.7]	[92-106]	4.91 ≤ 6.61	0.35	1.16
PPNL	8	1.6 – 9.3	0.9992	1.69	[98-114]	[-3.9; 2.6]	[91-106]	0.61 ≤ 6.61	0.25	0.82
CTS	8	1.5 – 9.2	0.9994	1.45	[98-103]	[-3.1; 1.8]	[98-103]	6.02 ≤ 6.61	0.21	0.69
CBZ	8	1.6 – 9.5	0.9997	1.00	[96-103]	[-2.0; 1.4]	[97-104]	4.91 ≤ 6.61	0.15	0.49
CFA	8	9.3 – 55.5	0.9986	2.24	[94-101]	[-2.9; 5.3]	[97-104]	0.47 ≤ 6.61	1.95	6.49
NPX	8	1.7 – 10.2	0.9997	1.02	[97-103]	[-1.4; 2.4]	[96-102]	2.29 ≤ 6.61	0.16	0.54
GTD	8	1.6 – 9.7	0.9984	2.36	[92-105]	[-4.3; 8.4]	[95-108]	4.92 ≤ 6.61	0.36	1.19
TTE	8	1.6 – 9.5	0.9997	0.98	[94-108]	[-1.7; 2.4]	[92-105]	6.35 ≤ 6.61	0.15	0.48
BZF	9	1.7 – 10.0	0.9999	0.66	[100-104]	[-2.2; 1.4]	[97-101]	0.36 ≤ 5.99	0.10	0.33
IBUP	9	3.2 – 19.4	0.9999	0.70	[100-103]	[-1.7; 0.9]	[98-101]	4.78 ≤ 5.99	0.20	0.67
DCF	9	1.7 – 10.3	0.9998	0.84	[94-108]	[-0.8; 1.1]	[92-106]	0.66 ≤ 5.99	0.13	0.43
E3	9	9.4 – 56.6	0.9998	0.79	[97-103]	[-0.8; 1.1]	[97-103]	5.81 ≤ 5.99	0.67	2.22
E1	9	8.6 – 51.4	0.9997	1.00	[100-104]	[-1.5; 2.2]	[98-102]	0.08 ≤ 5.99	0.76	2.53
E2	9	8.7 – 51.9	0.9995	1.36	[94-102]	[-1.7; 3.1]	[96-105]	1.53 ≤ 5.99	1.04	3.48
EE2	9	8.5 – 50.9	0.9990	1.89	[95-105]	[-3.4; 2.8]	[96-105]	0.16 ≤ 5.99	1.42	4.75
DES	9	9.0 – 54.0	0.9994	1.54	[98-107]	[-4.8; 2.8]	[94-103]	0.07 ≤ 5.99	1.23	4.11
ERT	7	1.6 – 9.6	0.9990	2.26	[100-104]	[-2.4; 3.2]	[98-102]	2.09 ≤ 7.71	0.31	1.04
FLX	6	1.6 – 9.8	0.9998	0.89	[97-111]	[-1.4; 3.7]	[91-105]	3.0 ≤ 10.13	0.15	0.51

**Table S3.** PhACs linearity range studies and respective instrumental analytical thresholds – medium concentration range (reported LOD and LOQ for medium linear range)

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F(0,05; 1; N-3)	LOD µg/L	LOQ µg/L
ATN	7	12.8 – 107.0	0.9998	1.14	[97-101]	[-2.6; 2.3]	[98-102]	0.30 ≤ 7.71	1.7	5.8
APAP	7	16.4 – 102.4	1.0000	0.31	[79-111]	[-0.4; 0.4]	[93-113]	0.34 ≤ 10.13	0.51	1.7
SDZ	7	12.6 – 104.9	0.9996	1.51	[100-108]	[-2.5; 3.9]	[97-105]	0.09 ≤ 7.71	2.3	7.5
SPD	7	12.7 – 105.5	0.9995	1.69	[99-106]	[-4.2; 2.0]	[96-103]	0.50 ≤ 7.71	2.5	8.5
CAF	7	12.8 – 106.3	0.9998	1.13	[96-103]	[-2.4; 2.8]	[97-103]	1.01 ≤ 7.71	1.7	5.7
SMX	7	12.6 – 105.0	0.9997	1.26	[95-102]	[-1.5; 1.1]	[96-103]	0.77 ≤ 7.71	1.9	6.3
MTPL	7	12.5 – 104.0	0.9999	0.78	[99-103]	[-2.3; 1.0]	[98-102]	4.63 ≤ 7.71	1.2	3.8
PPNL	7	12.2 – 102.0	0.9995	1.79	[97-100]	[-3.8; 2.7]	[99-102]	4.28 ≤ 7.71	2.6	8.7
CTS	7	12.8 – 106.3	0.9998	1.22	[99-103]	[-2.6; 1.8]	[98-102]	3.43 ≤ 7.71	1.8	6.2
CBZ	7	12.5 – 104.3	0.9998	1.00	[97-105]	[-1.5; 1.2]	[97-105]	0.60 ≤ 7.71	1.5	5.0
CFA	5	25.8 – 103.2	0.9998	0.77	[100-103]	[-0.9; 1.1]	[99-101]	0.16 ≤ 18.51	1.4	4.8
NPX	7	12.3 – 102.4	0.9997	1.31	[95-101]	[-2.0; 3.1]	[97-103]	0.64 ≤ 7.71	1.9	6.4
GTD	7	12.5 – 104.4	0.9999	0.66	[98-103]	[-0.8; 1.0]	[98-103]	6.54 ≤ 7.71	1.0	3.3
TTE	7	12.9 – 107.6	0.9999	0.64	[97-102]	[-2.7; 2.7]	[98-103]	0.09 ≤ 7.71	1.0	3.3
BZF	7	13.3 – 110.8	0.9996	1.49	[99-107]	[-2.1; 2.3]	[95-103]	0.00 ≤ 7.71	2.4	7.8
IBUP	7	12.9 – 107.6	0.9995	1.74	[97-109]	[-2.4; 3.0]	[93-105]	12.74 ≤ 7.71	2.7	8.9
DCF	7	13.7 – 114.4	0.9996	1.55	[97-108]	[-4.6; 1.9]	[95-106]	0.12 ≤ 7.71	2.5	8.4
E3	5	25.1 – 100.6	0.9994	1.42	[94-103]	[-1.3; 1.8]	[97-106]	1.51 ≤ 18.51	2.6	8.7
E1	5	25.4 – 101.6	0.9992	1.61	[95-101]	[-2.0; 3.6]	[98-105]	3.80 ≤ 18.51	3.0	10.0
E2	5	25.1 – 100.6	0.9997	1.06	[93-100]	[-1.6; 2.8]	[98-106]	4.17 ≤ 18.51	1.9	6.5
EE2	5	25.2 – 100.8	0.9998	0.78	[89-103]	[-1.3; 1.6]	[95-110]	1.30 ≤ 18.51	1.4	4.8
DES	5	25.5 – 101.8	0.9996	1.20	[94-100]	[-1.9; 3.2]	[98-105]	2.18 ≤ 18.51	2.2	7.4
ERT	6	42.8 – 642.6	0.9977	5.22	[86-100]	[-11; 7.1]	[92-107]	3.00 ≤ 10.13	39	129
FLX	5	17.5 – 87.3	0.9993	1.80	[92-137]	[-5.8; 7.6]	[78-116]	0.11 ≤ 18.51	2.6	8.7

**Table S4.** PhACs linearity range studies and respective instrumental analytical thresholds – high concentration range (reported LOD and LOQ for high linear range)

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F(0,05; 1; N-3)	LOD µg/L	LOQ µg/L
ATN	7	171.2 – 748.8	0.9992	1.56	[95-113]	[-2.6; 3.1]	[92-110]	1.88 ≤ 7.71	20.4	68.2
APAP	7	163.8 – 716.8	0.9989	1.84	[79-131]	[-2.2; 2.8]	[80-132]	1.07 ≤ 7.71	23.1	77.0
SDZ	7	167.8 – 734.2	0.9992	1.56	[97-109]	[-2.5; 2.9]	[95-107]	2.34 ≤ 7.71	20.0	66.7
SPD	7	168.9 – 738.7	0.9995	1.16	[91-111]	[-2.3; 0.9]	[92-112]	2.91 ≤ 7.71	15.0	50.1
CAF	7	170.1 – 744.0	0.9991	1.63	[96-109]	[-2.2; 2.2]	[95-107]	2.32 ≤ 7.71	21.2	70.8
SMX	7	168.0 – 734.9	0.9994	1.38	[98-106]	[-2.2; 1.8]	[97-104]	0.88 ≤ 7.71	17.8	59.3
MTPL	7	166.3 – 727.7	0.9994	1.34	[88-115]	[-2.3; 1.9]	[90-117]	1.85 ≤ 7.71	17.0	56.7
PPNL	7	163.2 – 714.1	0.9998	0.82	[87-109]	[-0.7; 0.6]	[92-115]	2.94 ≤ 7.71	10.3	34.2
CTS	7	170.1 – 744.2	0.9994	1.34	[93-109]	[-1.4; 1.3]	[93-110]	0.71 ≤ 7.71	17.4	58.1
CBZ	7	166.9 – 730.1	0.9999	0.63	[89-111]	[-0.6; 1.1]	[92-115]	0.20 ≤ 7.71	8.1	27.1
CFA	7	165.1 – 722.2	0.9993	1.46	[94-106]	[-2.1; 5.7]	[93-105]	0.88 ≤ 7.71	18.4	61.4
NPX	7	163.8 – 716.8	1.0000	0.34	[93-105]	[-0.7; 1.1]	[96-108]	3.89 ≤ 7.71	4.2	14.1
GTD	7	167.0 – 730.7	0.9996	1.15	[95-109]	[-3.1; 1.5]	[94-108]	1.63 ≤ 7.71	14.7	49.1
TTE	7	172.2 – 753.4	0.9995	1.27	[95-105]	[-1.5; 1.1]	[97-106]	2.77 ≤ 7.71	16.7	55.6
BZF	7	110.8 – 664.6	0.9996	1.23	[95-104]	[-1.1; 1.3]	[96-106]	0.16 ≤ 7.71	13.2	44.2
IBUP	7	107.6 – 645.8	0.9995	1.46	[96-100]	[-2.7; 1.8]	[98-102]	0.45 ≤ 7.71	15.3	50.9
DCF	7	114.4 – 686.5	0.9990	1.94	[86-117]	[-2.9; 1.6]	[88-119]	1.56 ≤ 7.71	21.6	71.8
E3	7	100.6 – 603.4	0.9996	1.32	[94-101]	[-2.1; 3.4]	[96-104]	1.87 ≤ 7.71	12.8	442.7
E1	7	101.6 – 609.5	0.9998	0.98	[93-107]	[-2.1; 1.6]	[94-109]	1.11 ≤ 7.71	9.6	32.1
E2	7	100.6 – 603.4	0.9994	1.51	[95-110]	[-4.4; 1.9]	[94-108]	0.00 ≤ 7.71	14.7	49.0
EE2	7	100.8 – 604.8	0.9995	1.43	[89-109]	[-2.7; 1.4]	[93-114]	3.46 ≤ 7.71	13.9	46.4
DES	7	101.8 – 611.0	0.9991	1.84	[92-104]	[-1.4; 2.4]	[96-108]	0.85 ≤ 7.71	18.2	60.5
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FLX	7	109.2 – 655.0	0.9994	1.75	[94-118]	[-3.0; 3.1]	[87-109]	0.11 ≤ 7.71	16.8	56.2

**Table S5.** Working range of standard addition calibration curve of PhACs in BEI WWI by SPE-UHPLC-MS/MS

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F(0,05; 1; N-3)
ATN	6	1.6 – 9.6	0.9993	2.1	[99-110]	[-8.7; 1.6]	[93-103]	5.49 ≤ 10.13
APAP	5	1.5 – 9.2	0.9998	0.59	[100-101]	[-1.0; 0.5]	[99-100]	0.04 ≤ 18.51
SDZ	7	1.6 – 9.4	0.9988	1.7	[95-100]	[-2.0; 3.0]	[98-103]	0.01 ≤ 7.71
SPD	6	1.5 – 9.2	0.9997	0.38	[100-101]	[-0.5; 0.3]	[99-100]	0.00 ≤ 10.13
CAF	6	1.6 – 9.4	0.9998	0.56	[99-101]	[-0.5; 0.6]	[100-101]	2.12 ≤ 10.13
SMX	7	1.6 – 9.6	0.9991	0.74	[98-100]	[-0.9; 1.5]	[99-102]	4.51 ≤ 7.71
MTPL	7	1.6 – 9.4	0.9998	0.67	[99-102]	[-1.2; 1.6]	[99-102]	0.16 ≤ 7.71
PPNL	7	1.6 – 9.3	0.9993	1.7	[95-102]	[-2.2; 5.1]	[97-105]	0.00 ≤ 7.71
CTS	7	1.5 – 9.2	0.9975	2.2	[91-100]	[-4.0; 5.1]	[96-105]	1.10 ≤ 7.71
CBZ	7	1.6 – 9.5	0.9990	0.79	[99-101]	[-0.8; 0.9]	[99-101]	0.38 ≤ 7.71
CFA	7	9.3 – 56	0.9990	1.7	[95-104]	[-4.0; 5.9]	[96-106]	0.14 ≤ 7.71
NPX	6	1.7 – 10	0.9993	1.5	[97-104]	[-3.2; 3.6]	[97-103]	0.54 ≤ 10.13
GTD	6	1.6 – 9.7	0.9991	1.0	[98-100]	[-0.8; 1.2]	[99-101]	0.25 ≤ 10.13
TTE	7	1.6 – 9.5	0.9988	2.2	[91-102]	[-2.6; 10.1]	[97-109]	1.60 ≤ 7.71
BZF	7	1.7 – 10	0.9974	1.2	[97-100]	[-1.0; 2.1]	[99-102]	1.49 ≤ 7.71
IBUP	6	3.2 – 19	0.9994	1.3	[97-103]	[-2.4; 3.5]	[97-103]	1.88 ≤ 10.13
DCF	6	1.7 – 10	0.9997	1.5	[100-103]	[-1.2; 1.6]	[99-102]	1.51 ≤ 10.13
E3	7	8.6 – 51	0.9990	2.2	[98-104]	[-3.3; 2.6]	[97-103]	0.26 ≤ 7.71
E1	7	8.7 – 52	0.9991	1.9	[97-101]	[-1.7; 2.7]	[98-103]	0.22 ≤ 7.71
E2	7	9.4 – 57	0.9994	1.6	[94-104]	[-3.6; 6.4]	[96-106]	0.21 ≤ 7.71
EE2	6	9.0 – 54	0.9984	2.7	[96-105]	[-4.4; 4.2]	[95-105]	2.55 ≤ 10.13
DES	6	8.5 – 51	0.9993	1.7	[97-105]	[-4.6; 3.6]	[95-101]	0.10 ≤ 10.13
ERT	5	1.6 – 9.6	0.9972	2.4	[100-106]	[-3.0; 2.4]	[97-102]	0.13 ≤ 18.51
FLX	6	1.6 – 9.8	0.9992	3.10	[97-110]	[-6.0; 5.9]	[93-105]	0.27 ≤ 10.13

**Table S6.** Working range of standard addition calibration curve of PhACs in BEI WWE by SPE-UHPLC-MS/MS

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F(0,05; 1; N-3)
ATN	7	1.6 – 9.6	0.9998	0.86	[96-100]	[-1.1; 3.0]	[99-103]	1.67 ≤ 7.71
APAP	6	1.5 – 9.2	0.9998	0.94	[94-103]	[-1.5; 1.1]	[96-105]	1.43 ≤ 10.13
SDZ	6	1.6 – 9.4	0.9997	1.3	[100-104]	[-2.5; 1.8]	[97-101]	0.02 ≤ 10.13
SPD	7	1.5 – 9.2	0.9990	0.93	[99-101]	[-1.3; 0.9]	[99-101]	0.02 ≤ 7.71
CAF	7	1.6 – 9.4	0.9996	1.4	[89-103]	[-3.1; 9.7]	[96-110]	2.27 ≤ 7.71
SMX	7	1.6 – 9.6	0.9993	0.88	[100-102]	[-1.1; 1.1]	[99-101]	0.02 ≤ 7.71
MTPL	7	1.6 – 9.4	0.9996	1.3	[98-105]	[-2.7; 4.1]	[97-104]	0.00 ≤ 7.71
PPNL	6	1.6 – 9.3	0.9997	1.1	[98-103]	[-1.5; 2.1]	[98-102]	0.05 ≤ 10.13
CTS	6	1.5 – 9.2	0.9996	1.4	[90-102]	[-1.4; 2.3]	[95-108]	0.00 ≤ 10.13
CBZ	7	1.6 – 9.5	0.9995	0.51	[99-101]	[-0.6; 1.0]	[99-101]	0.87 ≤ 7.71
CFA	6	9.3 – 56	0.9980	3.0	[94-102]	[-3.4; 3.7]	[96-104]	0.63 ≤ 10.13
NPX	7	1.7 – 10	0.9997	1.2	[100-108]	[-5.8; 1.6]	[94-102]	0.11 ≤ 7.71
GTD	6	1.6 – 9.7	0.9992	1.9	[87-103]	[-3.1; 3.9]	[94-111]	0.20 ≤ 10.13
TTE	6	1.6 – 9.5	0.9996	1.4	[97-104]	[-2.1; 3.3]	[96-104]	0.38 ≤ 10.13
BZF	7	1.7 – 10	0.9991	2.1	[90-101]	[-2.5; 9.7]	[97-109]	0.16 ≤ 7.71
IBUP	6	3.2 – 19	0.9997	1.2	[96-103]	[-1.8; 1.4]	[97-104]	0.12 ≤ 10.13
DCF	4	1.7 – 10	0.9987	3.1	[96-104]	[-3.2; 3.8]	[96-104]	0.93 ≤ 161.5
E3	5	8.6 – 51	0.9997	1.37	[100-110]	[-2.0; 2.2]	[94-103]	0.13 ≤ 18.51
E1	6	8.7 – 52	0.9993	1.8	[95-108]	[-6.1; 4.6]	[92-104]	0.00 ≤ 10.13
E2	6	9.4 – 57	0.9988	2.3	[93-101]	[-2.6; 5.9]	[97-106]	1.86 ≤ 10.13
EE2	6	9.0 – 54	0.9977	3.2	[100-109]	[-4.6; 4.0]	[96-104]	1.16 ≤ 10.13
DES	5	8.5 – 51	0.9996	1.5	[98-109]	[-5.0; 2.4]	[93-103]	0.45 ≤ 18.51
ERT	4	1.6 – 9.6	0.9991	2.6	[95-103]	[-2.5; 6.2]	[97-105]	31.1 ≤ 161.5
FLX	6	1.6 – 9.8	0.9990	2.2	[100-105]	[-3.4; 5.3]	[97-102]	2.75 ≤ 10.13

**Table S7.** Working range of standard addition calibration curve of PhACs in FNw WWI by SPE-UHPLC-MS/MS

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F(0,05; 1; N-3)
ATN	7	1.6 – 9.6	0.9989	0.80	[98 - 100]	[-1.1; 1.1]	[99 - 101]	1.51 ≤ 7.71
APAP	5	1.5 – 9.2	0.9998	1.05	[99 - 102]	[-1.2; 0.9]	[98 - 101]	4.61 ≤ 18.51
SDZ	6	1.6 – 9.4	0.9998	0.96	[97 - 100]	[-1.4; 1.6]	[99 - 102]	0.05 ≤ 10.13
SPD	7	1.5 – 9.2	0.9984	1.37	[99 - 103]	[-1.6; 2.3]	[98 - 102]	1.02 ≤ 7.71
CAF	6	1.6 – 9.4	0.9998	0.59	[99 - 100]	[-0.9; 0.7]	[99 - 101]	0.87 ≤ 10.13
SMX	7	1.6 – 9.6	0.9992	0.67	[100 - 102]	[-0.9; 0.9]	[99 - 101]	5.02 ≤ 7.71
MTPL	7	1.6 – 9.4	0.9999	0.59	[99 - 101]	[-1.4; 0.8]	[99 - 101]	0.46 ≤ 7.71
PPNL	7	1.6 – 9.3	0.9987	2.19	[92 - 109]	[-7.5; 3.5]	[93 - 104]	3.24 ≤ 7.71
CTS	6	1.5 – 9.2	0.9984	1.69	[98 - 108]	[-2.1; 1.9]	[94 - 104]	3.13 ≤ 10.13
CBZ	6	1.6 – 9.5	0.9989	0.71	[100 - 102]	[-0.7; 0.9]	[99 - 101]	2.69 ≤ 10.13
CFA	6	9.3 – 56	0.9992	1.84	[93 - 103]	[-2.3; 1.9]	[96 - 106]	1.12 ≤ 10.13
NPX	6	1.7 – 10	0.9999	0.77	[98 - 101]	[-1.3; 2.4]	[98 - 102]	6.14 ≤ 10.13
GTD	5	1.6 – 9.7	0.9991	2.19	[96 - 103]	[-2.2; 2.8]	[97 - 104]	1.15 ≤ 18.51
TTE	6	1.6 – 9.5	0.9990	1.81	[100 - 109]	[-3.0; 2.3]	[95 - 103]	0.39 ≤ 10.13
BZF	7	1.7 – 10	0.9987	1.31	[99 - 102]	[-2.3; 1.4]	[98 - 101]	0.82 ≤ 7.71
IBUP	6	3.2 – 19	0.9989	2.23	[92 - 100]	[-2.2; 6.3]	[97 - 106]	0.72 ≤ 10.13
DCF	5	1.7 – 10	0.9997	1.31	[97 - 104]	[-4.8; 2.3]	[96 - 103]	1.07 ≤ 18.51
E3	7	8.6 – 51	0.9994	1.77	[97 - 105]	[-3.2; 4.8]	[96 - 104]	0.04 ≤ 7.71
E1	7	8.7 – 52	0.9994	1.88	[88 - 100]	[-2.5; 10.2]	[96 - 109]	0.00 ≤ 7.71
E2	6	9.4 – 57	0.9989	2.13	[98 - 105]	[-3.4; 3.8]	[97 - 104]	0.65 ≤ 10.13
EE2	5	9.0 – 54	0.9972	3.36	[100 - 108]	[-3.6; 3.5]	[97 - 104]	0.02 ≤ 18.51
DES	6	8.5 – 51	0.9984	1.53	[95 - 100]	[-1.5; 3.6]	[99 - 103]	2.06 ≤ 10.13
ERT	5	1.6 – 9.6	0.9975	3.34	[91 - 106]	[-6.9; 8.1]	[93 - 108]	0.09 ≤ 18.51
FLX	6	1.6 – 9.8	0.9976	3.10	[97-110]	[-6.0; 5.9]	[93-105]	0.27 ≤ 10.13



**Table S8.** Working range of standard addition calibration curve of PhACs in FNw WWE by SPE-UHPLC-MS/MS

PhACs	N	C µg/L	r <sup>2</sup>	CV <sub>m</sub> (%)	Norm (%) [85-115]	Residues (%) [85-115]	RIKILT (%) [90-110]	Mandel test PG ≤ F(0,05; 1; N-3)
ATN	7	1.6 – 9.6	0.9995	1.2	[98-101]	[-1.0; 2.1]	[99-102]	1.28 ≤ 7.71
APAP	7	1.5 – 9.2	0.9995	1.2	[95-101]	[-2.5; 2.8]	[97-103]	0.00 ≤ 7.71
SDZ	7	1.6 – 9.4	1.0000	0.36	[99-100]	[-0.6; 1.2]	[99-101]	2.22 ≤ 7.71
SPD	7	1.5 – 9.2	0.9997	1.1	[97-100]	[-1.6; 2.0]	[98-102]	0.02 ≤ 7.71
CAF	7	1.6 – 9.4	0.9984	0.70	[99-100]	[-0.8; 0.9]	[99-101]	1.38 ≤ 7.71
SMX	7	1.6 – 9.6	0.9992	1.4	[100-104]	[-3.1; 1.7]	[97-102]	0.01 ≤ 7.71
MTPL	7	1.6 – 9.4	0.9996	1.3	[100-104]	[-2.2; 1.8]	[98-102]	2.75 ≤ 7.71
PPNL	6	1.6 – 9.3	0.9976	3.1	[91-100]	[-2.7; 6.7]	[97-106]	7.68 ≤ 10.13
CTS	6	1.5 – 9.2	0.9992	1.8	[100-105]	[-2.5; 2.5]	[98-103]	0.72 ≤ 10.13
CBZ	7	1.6 – 9.5	0.9996	0.47	[100-101]	[-0.5; 0.7]	[99-101]	0.12 ≤ 7.71
CFA	6	9.3 – 56	1.0000	0.46	[96-101]	[-0.9; 1.0]	[98-104]	0.00 ≤ 10.13
NPX	7	1.7 – 10	0.9992	1.5	[99-103]	[-2.0; 2.0]	[98-102]	1.22 ≤ 7.71
GTD	6	1.6 – 9.7	0.9981	2.9	[94-102]	[-3.9; 4.1]	[96-104]	0.04 ≤ 10.13
TTE	5	1.6 – 9.5	0.9991	2.3	[93-103]	[-3.1; 6.5]	[96-107]	6.79 ≤ 18.51
BZF	7	1.7 – 10	0.9996	1.4	[91-103]	[-3.7; 8.8]	[96-108]	1.55 ≤ 7.71
IBUP	7	3.2 – 19	0.9984	3.1	[97-109]	[-6.7; 4.7]	[94-105]	0.52 ≤ 7.71
DCF	4	1.7 – 10	0.9997	1.4	[98-102]	[-3.3; 1.2]	[98-101]	22.7 ≤ 161.5
E3	6	8.6 – 51	0.9989	2.2	[100-104]	[-2.8; 1.9]	[98-102]	3.13 ≤ 10.13
E1	6	8.7 – 52	0.9992	1.8	[95-105]	[-2.1; 2.8]	[95-105]	8.98 ≤ 10.13
E2	6	9.4 – 57	0.9988	2.3	[97-108]	[-4.6; 12.2]	[93-104]	3.96 ≤ 10.13
EE2	6	9.0 – 54	0.9978	3.1	[94-109]	[-6.7; 8.2]	[93-108]	0.10 ≤ 10.13
DES	6	8.5 – 51	0.9995	1.5	[99-103]	[-2.2; 2.3]	[98-102]	0.07 ≤ 10.13
ERT	5	1.6 – 9.6	0.9993	1.3	[95-103]	[-2.0; 2.5]	[97-105]	1.05 ≤ 18.51
FLX	5	1.6 – 9.8	0.9996	1.4	[89-101]	[-1.2; 2.7]	[95-108]	3.65 ≤ 10.13

**Table S9.** Limits of detection (LOD) and limits of quantification (LOQ) for target PhACS determined based on calibration curve and repeatability conditions for influent (BEI WWI) and effluent (BEI WWE) wastewaters of Beirolas WWTP

PhAC	BEI WWI				BEI WWE			
	CaL curve		Repeat		CaL curve		Repeat	
	LOD µg/L	LOQ µg/L	LOD µg/L	LOQ µg/L	LOD µg/L	LOQ µg/L	LOD µg/L	LOQ µg/L
ATN	0.23	0.75	2.25	7.49	0.17	0.58	0.36	1.20
APAP	0.29	0.98	---	---	0.14	0.46	0.86	2.87
SDZ	0.33	1.09	0.16	0.54	0.19	0.62	0.24	0.81
SPD	0.47	1.57	1.77	5.91	0.33	1.11	0.85	2.82
CAF	0.31	1.02	---	---	0.22	0.72	---	---
SMX	0.41	1.37	1.91	6.31	0.29	0.97	0.68	2.27
MTPL	0.23	0.78	0.54	1.79	0.22	0.73	0.29	0.98
PPNL	0.19	0.64	0.44	1.47	0.17	0.56	1.02	3.39
CTS	0.33	1.11	0.33	1.08	0.20	0.68	0.22	0.75
CBZ	0.52	1.72	0.14	0.47	0.26	0.85	0.21	0.70
CFA	0.71	2.38	0.79	2.62	2.64	8.80	4.55	15.16
NPX	0.14	0.46	---	---	0.21	0.71	0.42	1.39
GTD	0.26	0.85	0.32	1.07	0.28	0.95	0.41	1.37
TTE	0.25	0.85	0.31	1.03	0.21	0.70	1.11	3.69
BZF	0.35	1.17	0.09	0.31	0.34	1.13	0.17	0.59
IBUP	0.74	2.47	0.03	0.12	0.35	1.17	0.50	1.66
DCF	0.18	0.61	---	---	0.52	1.72	---	---
E3	2.42	8.08	0.61	2.05	1.01	3.36	0.98	3.28
E1	1.64	5.46	2.42	8.05	1.44	4.79	1.61	5.36
E2	2.06	6.85	4.24	14.13	2.06	6.86	3.39	11.31
EE2	1.73	5.75	2.20	7.33	2.72	9.08	1.93	6.42
DES	0.96	3.20	1.68	5.59	1.20	4.00	0.67	2.25
ERT	0.53	1.77	0.32	1.07	0.35	1.18	0.48	1.60
FLX	0.21	0.69	---	---	0.36	1.21	0.11	0.37

**Table S10.** Limits of detection (LOD) and limits of quantification (LOQ) for target PhACS determined based on calibration curve and repeatability conditions for influent (FNw WWI) and effluent (FNw WWE) wastewaters of Faro NW WWTP

FNw WWI				FNw WWE			
CaL curve		Repeat		CaL curve		Repeat	
LOD µg/L	LOQ µg/L	LOD µg/L	LOQ µg/L	LOD µg/L	LOQ µg/L	LOD µg/L	LOQ µg/L
0.36	1.20	0.58	1.94	0.24	0.81	0.33	1.09
0.16	0.54	---	---	0.24	0.80	0.31	1.04
0.16	0.52	0.29	0.95	0.05	0.18	0.71	2.38
0.43	1.43	0.63	2.11	0.19	0.64	0.91	3.02
0.15	0.50	---	---	0.43	1.43	---	---
0.30	1.01	0.39	1.30	0.30	1.01	0.75	2.50
0.11	0.38	0.44	1.46	0.21	0.70	0.34	1.13
0.39	1.31	0.17	0.57	0.43	1.42	0.32	1.08
0.34	1.14	0.82	2.73	0.28	0.93	0.40	1.34
0.34	1.13	0.23	0.76	0.22	0.73	0.03	0.11
1.62	5.40	1.72	5.74	0.40	1.33	2.89	9.64
0.16	0.52	---	---	0.33	1.09	0.74	2.46
0.35	1.18	0.31	1.05	0.45	1.50	0.23	0.76
0.32	1.08	0.43	1.44	0.35	1.15	0.63	2.09
0.41	1.37	0.40	1.33	0.22	0.74	0.54	1.82
0.84	2.81	0.43	1.44	0.89	2.98	0.63	2.09
0.23	0.75	---	---	0.22	0.75	---	---
1.44	4.81	0.46	1.54	1.77	5.90	0.40	1.32
1.50	5.01	0.89	2.97	1.51	5.03	0.69	2.29
2.01	6.71	0.66	2.18	2.04	6.79	0.70	2.33
2.36	7.87	1.16	3.86	2.70	9.01	0.89	2.97
1.31	4.38	0.74	2.46	1.21	4.02	1.88	6.28
0.58	1.92	0.09	0.29	0.26	0.86	0.24	0.81
0.45	1.51	0.32	1.07	0.22	0.73	0.77	2.58

**Table S11.** Absolute recovery of PhACs in influent and effluent wastewater of Beirolas WWTP by SPE-UHPLC-MS/MS

Comp.	Conc. (ng/L)	BEI WWI	BEI WWE	Conc. (ng/L)	BEI WWI	BEI WWE
		Recovery, % (RSD, %)			Recovery, % (RSD, %)	
ATN	53	158 (18)	74.8 (6.0)	193	88.3 (8.9)	81.7 (4.4)
APAP	51	---	60.9 (18)	184	---	58.3 (3.9)
SDZ	52	32.6 (6.3)	75.8 (4.1)	187	38.6 (4.3)	77.3 (5.4)
SPD	51	65.2 (36)	59.4 (19)	184	70.2 (18)	69.2 (5.4)
CAF	52	115 (3.2)	115(2.2)	189	109 (3.2)	115 (1.7)
SMX	53	98.0 (24)	86.9 (9.9)	191	90.5 (4.0)	90.0 (7.3)
MTPL	52	115 (6.0)	123 (3.1)	188	119 (1.9)	104 (14)
PPNL	52	109 (3.7)	107 (5.9)	186	118 (2.2)	107 (4.3)
CTS	51	40.4 (40)	70.9 (4.1)	184	36.1 (36)	67.6 (4.6)
CBZ	53	102 (0.68)	102 (1.8)	190	100 (1.8)	100 (0.7)
CFA	309	76.2 (2.2)	119 (8.3)	1111	78.9 (1.8)	122 (3.8)
NPX	57	98.6 (2.8)	87.1 (5.6)	204	104 (1.2)	92.1 (4.0)
GTD	54	93.4 (3.3)	96.8 (2.1)	194	101 (2.0)	102 (1.5)
TTE	53	28.3 (11)	73.9 (19)	189	34.5 (3.2)	47.7 (24)
BZF	55	121 (14)	132 (4.2)	199	105 (4.0)	128 (2.3)
IBUP	108	114 (2.2)	90.8 (3.1)	387	121 (1.3)	98.0 (1.4)
DCF	57	141 (2.2)	139 (2.6)	206	147 (2.0)	129 (3.2)
E3	289	83.0 (1.5)	89.4 (5.3)	1039	79.8 (4.7)	84.2 (12)
E1	286	45.6 (29)	45.2 (18)	1029	48.3 (17)	30.7 (30)
E2	314	52.8 (29)	48.7 (17)	1131	52.6 (17)	35.6 (30)
EE2	300	32.3 (35)	30.6 (30)	1080	35.6 (28)	22.9 (32)
DES	283	91.8 (1.9)	86.2 (21)	1018	99.7 (13)	88.0 (16)
ERT	54	233 (6.8)	140 (20)	193	340 (6.8)	222 (18)
FLX	55	235 (11)	179 (15)	196	200 (7.2)	132 (17)

**Table S12.** Absolute recovery of PhACs in influent and effluent wastewater of Faro NW WWTP by SPE-UHPLC-MS/MS

Comp.	Conc. (ng/L)	FNw WWI	FNw WWE	Conc. (ng/L)	FNw WWI	FNw WWE
		Recovery, % (RSD, %)			Recovery, % (RSD, %)	
ATN	53	22.3 (33)	22.2 (18)	193	32.4 (7.7)	33.3 (5.9)
APAP	51	32.1 (8.3)	189 (2.6)	184	94.5 (4.0)	168 (4.4)
SDZ	52	64.3 (5.7)	95.5 (9.6)	187	72.6 (4.8)	120 (8.2)
SPD	51	---	62.0 (19)	184	46.9 (6.7)	104 (6.2)
CAF	52	121 (3.8)	108 (2.6)	189	114 (1.5)	104 (4.4)
SMX	53	---	---	191	25.4 (11)	52.3 (9.9)
MTPL	52	29.0 (19)	---	188	46.7 (9.4)	33.2 (11)
PPNL	52	95.0 (2.8)	98.2 (3.1)	186	125 (2.6)	103 (3.3)
CTS	51	232 (4.6)	29.5 (18)	184	92.9 (4.5)	44.6 (7.1)
CBZ	53	102 (1.2)	103 (0.40)	190	101 (0.70)	98.7 (4.1)
CFA	309	59.8 (6.2)	59.6 (10)	1111	59.6 (4.2)	77.8 (6.3)
NPX	57	97.3 (2.4)	27.8 (31) 97.9 (1.5)	204	103 (1.2)	64.7 (8.3) 99.7 (4.8)
GTD	54	95.9 (2.6)	15.1 (19) 95.1 (3.8)	194	18.6 (6.2) 103 (1.4)	27.4 (11) 97.8 (4.5)
TTE	53	---	22.3 (36) 87.1 (1.5)	189	21.6 (18)	40.2 (8.5) 94.3 (4.4)
BZF	55	102 (2.1)	49.6 (26)	199	78.6 (6.0)	70.2 (10)
IBUP	108	108 (2.2)	---	387	109 (3.5)	61.1 (26)
DCF	57	163 (1.7)	155 (2.5)	206	167 (1.9)	147 (18)
E3	289	93.5 (8.5)	67.2 (7.1)	1039	97.1 (2.6)	93.4 (7.0)
E1	286	38.7 (23)	50.9 (20)	1029	48.4 (15)	76.7 (13)
E2	314	48.3 (9.0)	52.2 (17)	1131	57.3 (8.9)	75.0 (13)
EE2	300	59.1 (20)	44.2 (31)	1080	61.0 (11)	68.3 (17)
DES	283	85.1 (21)	84.7 (18)	1018	125 (5.1)	77.0 (15)
ERT	54	197 (8.8)	141 (13)	193	74.5 (13)	166 (33)
FLX	55	109 (8.5)	117 (21)	196	312 (16)	76.5 (29)

**Table S13.** Precision of the SPE-UHPLC-MS/MS method at two concentration levels (n = 10) under repeatability conditions.

PhAC	Low concentration range					High concentration range				
	Conc. µg/L	BEI WWI	BEI WWE	FNw WWI	FNw WWE	Conc. µg/L	BEI WWI	BEI WWE	FNw WWI	FNw WWE
		RSD (%)					RSD (%)			
ATN	53	6.24	2.72	3.39	6.60	193	4.64	3.34	2.91	4.40
APAP	51	3.85	15.7	6.05	3.52	184	4.12	3.74	6.99	2.66
SDZ	52	11.0	4.83	4.91	7.03	187	4.84	5.63	4.63	7.60
SPD	51	5.33	2.63	3.29	3.30	184	7.11	3.09	2.48	3.43
CAF	52	7.00	20.5	6.51	9.59	189	5.44	2.31	4.90	12.3
SMX	53	3.95	1.65	2.43	3.56	191	1.57	3.14	2.82	4.02
MTPL	52	1.91	2.34	1.93	1.93	188	1.61	11.1	6.55	6.50
PPNL	52	12.0	13.2	22.8	15.3	186	10.8	22.4	18.1	12.9
CTS	51	4.97	3.55	3.82	10.2	184	4.31	4.39	3.97	6.21
CBZ	53	2.93	1.14	2.14	3.28	190	1.77	4.27	2.80	4.22
CFA	309	1.96	7.52	5.26	7.65	1111	1.73	3.67	4.03	5.82
NPX	57	1.62	2.69	3.39	4.11	204	1.05	3.09	2.09	4.66
GTD	54	9.58	10.2	13.3	7.84	194	5.93	19.9	4.60	8.90
TTE	53	6.45	16.1	5.49	14.7	189	2.50	18.7	13.5	6.97
BZF	55	2.57	2.39	10.8	12.7	199	1.50	1.9	3.50	8.59
IBUP	108	1.15	2.64	20.3	19.0	387	1.62	1.3	12.1	17.7
*DCF	57	---	---	---	---	206	---	---	---	---
E3	289	6.03	4.56	5.35	5.24	1039	4.17	11.5	2.30	5.90
E1	286	20.8	13.6	12.4	10.6	1029	15.2	19.9	13.0	11.4
E2	314	24.6	14.8	6.89	9.70	1131	16.4	21.8	8.05	11.6
EE2	300	19.00	17.9	12.81	14.6	1080	19.1	21.9	9.45	14.4
DES	283	11.5	12.1	15.2	12.2	1018	11.5	20.8	20.4	16.4
ERT	54	11.2	19.0	3.98	7.75	193	4.69	28.2	5.45	7.01
FLX	55	13.1	4.77	14.0	18.0	196	15.6	20.2	22.1	20.4

**Table S14:** Individual uncertainty components and respective expanded uncertainty estimated in the analysis of the 24 PhACs in wastewater influents from Beirolas WWTP by SPE-UHPLC-MS/MS.

PhAC	Bottom-up approach				Top-down approach			Nordtest approach		
	$u_{precision}$ (%)	$u_{standard}$ (%)	$u_{curve}$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_b$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_{bias}$ (%)	$U$ (%) $k = 2$
ATN	0.7	2.7	4.7	10.8	2.8	8.3	17.5	2.8	3.9	9.5
APAP	0.7	1.3	1.2	3.8	3.6	11.1	23.4	3.6	5.7	13.5
SDZ	0.4	2.3	1.0	5.0	1.0	3.8	7.8	1.0	2.5	5.4
SPD	3.0	2.3	4.9	12.4	5.8	14.7	31.6	5.8	5.9	16.5
CAF	0.6	1.4	7.1	14.5	1.0	3.3	6.9	1.0	1.7	3.9
SMX	2.3	1.7	3.6	9.3	4.4	13.3	28.1	4.4	4.7	12.9
MTPL	1.1	4.6	3.0	5.6	1.1	5.7	11.7	1.1	4.8	9.8
PPNL	0.9	4.5	1.5	9.7	1.1	5.7	11.7	1.1	4.8	9.9
CTS	1.2	2.5	8.8	18.4	1.3	4.7	9.8	1.3	2.8	6.3
CBZ	1.4	1.7	-0.5	4.6	0.2	13.6	27.1	0.2	1.8	3.5
CFA	1.6	4.1	6.5	15.6	0.6	4.7	9.4	0.6	4.3	8.7
NPX	1.1	1.3	3.4	7.6	0.7	3.0	6.1	0.7	2.2	4.7
GTD	1.3	4.4	5.3	14.0	1.0	5.6	11.3	1.0	4.8	9.8
TTE	1.1	2.5	2.6	7.5	1.8	6.0	12.5	1.8	3.1	7.1
BZF	4.9	2.5	3.6	13.2	0.7	3.3	6.7	0.7	2.7	5.5
IBUP	1.0	1.7	2.4	6.2	0.9	3.2	6.7	0.9	2.0	4.3
DCF	1.0	1.0	8.9	18.1	0.6	2.5	5.2	0.6	1.8	3.9
E3	1.3	4.4	4.5	12.7	1.8	7.2	14.9	1.8	4.7	10.1
E1	1.5	4.4	10.2	22.5	6.7	20.4	42.9	6.7	7.7	20.3
E2	1.1	4.3	5.6	14.3	5.3	14.7	31.3	5.3	6.9	17.4
EE2	1.8	4.6	6.0	15.4	7.2	22.0	46.3	7.2	8.4	22.1
DES	1.6	4.4	5.3	14.2	2.6	9.0	18.8	2.6	5.2	11.6
ERT	1.6	2.5	6.6	14.4	2.8	8.9	18.6	2.8	3.8	9.5
FLX	1.9	2.6	3.4	9.3	3.7	11.3	23.8	3.7	4.6	11.7

**Table S15:** Individual uncertainty components and respective expanded uncertainty estimated in the analysis of the 24 PhACs in wastewater effluents from Beirolas WWTP by SPE-UHPLC-MS/MS.

PhAC	Bottom-up approach				Top-down approach			Nordtest approach		
	$u_{precision}$ (%)	$u_{standard}$ (%)	$u_{curve}$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_b$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_{bias}$ (%)	$U$ (%) $k = 2$
ATN	0.93	2.7	1.9	6.8	1.0	4.1	8.5	1.0	2.9	6.2
APAP	1.1	2.1	1.3	5.5	4.3	13.1	27.6	4.3	5.1	13.3
SDZ	0.2	2.3	2.1	6.2	0.9	3.5	7.1	0.9	2.4	5.2
SPD	0.6	2.3	2.1	6.3	3.1	9.5	20	3.1	3.4	9.2
CAF	0.9	1.4	10.5	21.3	0.7	2.5	5.1	0.7	1.5	3.3
SMX	1.2	1.7	1.0	4.7	1.6	5.2	10.8	1.6	2.4	5.7
MTPL	0.8	4.6	1.8	10	0.8	5.2	10.6	0.8	4.7	9.5
PPNL	1.0	4.5	1.1	9.5	4.0	12.8	26.7	4.0	6.1	14.6
CTS	1.2	2.5	6.9	14.9	1.1	4.2	8.7	1.1	2.8	6.0
CBZ	2.0	1.7	-1.3	5.9	0.2	13.6	27.1	0.2	1.8	3.5
CFA	1.3	4.1	7.2	16.7	2.8	9.3	19.4	2.8	5.1	11.6
NPX	1.0	2.1	0.4	4.7	1.6	5.3	11	1.6	2.7	6.2
GTD	0.9	4.4	4.3	12.5	0.6	5.0	10.2	0.6	4.7	9.5
TTE	0.5	2.5	3.5	8.6	5.7	14.2	30.7	5.7	6.2	16.9
BZF	0.9	2.5	11.8	24.1	2.7	8.5	17.7	2.7	3.7	9.2
IBUP	1.4	1.7	3.5	8.3	2.1	6.6	13.8	2.1	2.7	6.9
DCF	1.0	1.0	9.5	19.2	0.8	2.9	6.0	0.8	1.9	4.1
E3	0.6	4.4	4.4	12.5	1.5	6.2	12.8	1.5	4.6	9.7
E1	0.8	4.4	5.0	13.4	2.5	17.6	35.5	2.5	6.8	14.6
E2	1.3	4.3	5.1	13.5	5.8	18	37.9	5.8	7.3	18.7
EE2	1.5	4.6	6.8	16.6	6.7	19.6	41.4	6.7	8.1	21.0
DES	1.3	4.4	5.4	14.3	4.4	12.5	26.6	4.4	6.3	15.4
ERT	1.4	2.5	7.7	16.4	6.6	19.9	41.9	6.6	7.1	19.3
FLX	1.2	2.6	3.6	9.2	5.1	15.4	32.4	5.1	7.6	15.3



**Table S16:** Individual uncertainty components and respective expanded uncertainty estimated in the analysis of the 24 PhACs in wastewater influents from Faro NW WWTP by SPE-UHPLC-MS/MS.

PhAC	Bottom-up approach				Top-down approach			Nordtest approach		
	$u_{precision}$ (%)	$u_{standard}$ (%)	$u_{curve}$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_b$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_{bias}$ (%)	$U$ (%) $k = 2$
ATN	4.47	2.7	10.9	24.2	0.7	3.5	7.2	0.7	2.8	5.8
APAP	1.1	2.1	1.9	6.1	2.1	6.8	14.2	2.1	3.4	8.0
SDZ	0.2	2.3	6.9	14.6	1.3	4.5	9.4	1.3	2.6	5.9
SPD	1.3	2.3	15.9	32.2	5.8	15.3	32.8	5.8	5.9	16.5
CAF	0.6	1.4	9.6	19.4	1.3	4.2	8.8	1.3	1.9	4.6
SMX	2.0	1.7	-7.3	15.5	0.7	2.6	5.4	0.7	1.8	3.9
MTPL	2.9	4.6	0.6	11	2.9	9.4	19.7	2.9	5.5	12.4
PPNL	1.1	4.5	0.6	9.4	0.9	18.5	37.1	0.9	4.8	9.7
CTS	1.0	2.5	3.2	8.3	1.3	4.7	9.8	1.3	2.8	6.3
CBZ	1.2	1.7	7.5	15.6	0.4	2.1	4.2	0.4	1.8	3.6
CFA	1.6	4.1	5.3	13.7	1.6	6.4	13.1	1.6	4.6	9.6
NPX	1.1	1.3	3.4	7.6	0.8	3.1	6.5	0.8	2.3	4.8
GTD	1.3	2.7	3.6	9.2	0.8	5.3	10.6	0.8	4.8	9.7
TTE	1.3	2.5	4.3	10.2	1.6	5.4	11.3	1.6	2.9	6.7
BZF	1.4	2.5	8.1	17.2	0.6	3.1	6.4	0.6	2.7	5.5
IBUP	1.0	1.7	2.4	6.2	0.7	2.8	5.7	0.7	1.9	4.1
DCF	1.0	1.0	8.0	16.2	0.5	2.3	4.7	0.5	1.8	3.8
E3	1.3	4.4	0.6	9.2	1.9	7.2	14.9	1.9	4.8	10.3
E1	1.6	4.4	4.9	13.6	3.0	.9	18.7	3.0	4.8	11.4
E2	1.1	4.3	15.0	31.4	2.1	7.6	15.8	2.1	4.9	10.6
EE2	1.7	4.6	5.5	14.8	2.3	7.4	15.5	2.3	5.0	10.9
DES	1.2	4.4	3.4	11.4	3.5	10.2	21.6	3.5	5.7	13.3
ERT	1.4	2.5	4.2	10.3	1.8	5.4	11.3	1.8	3.1	7.2
FLX	1.4	2.6	9.9	20.6	1.7	5.7	11.9	1.7	3.2	7.2

**Table S17:** Individual uncertainty components and respective expanded uncertainty estimated in the analysis of the 24 PhACs in wastewater effluents from Faro Nw WWTP by SPE-UHPLC-MS/MS.

PhAC	Bottom-up approach				Top-down approach			Nordtest approach		
	$u_{precision}$ (%)	$u_{standard}$ (%)	$u_{curve}$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_b$ (%)	$U$ (%) $k = 2$	$u_{Rw}$ (%)	$U_{bias}$ (%)	$U$ (%) $k = 2$
ATN	1.0	2.7	5.1	11.6	0.6	3.2	6.6	0.6	2.8	5.7
APAP	1.4	2.1	11.6	23.7	1.3	4.8	9.9	1.3	3.0	6.5
SDZ	0.2	2.3	3.9	9.0	3.3	10.2	21.4	3.3	4.0	10.4
SPD	1.3	2.3	3.3	8.5	4.2	12.5	26.4	4.2	4.3	12
CAF	1.7	1.4	3.5	8.3	0.7	2.6	5.4	0.7	1.5	3.4
SMX	0.8	1.7	-7.5	15.5	0.6	2.5	5.2	0.6	1.8	3.9
MTPL	1.2	4.6	0.9	9.7	1.2	5.9	12.1	1.2	4.8	9.9
PPNL	0.6	4.5	1.7	9.8	1.2	6.0	12.2	1.2	4.8	10.0
CTS	1.5	2.5	1.7	6.7	1.3	4.6	9.7	1.3	2.8	6.2
CBZ	1.8	1.7	1.4	5.7	0.1	13.7	27.3	0.1	1.7	3.5
CFA	1.6	4.1	3.8	11.6	2.1	7.6	15.8	2.1	4.8	10.4
NPX	1.1	2.1	1.4	5.5	0.4	2.5	5.0	0.4	2.2	4.4
GTD	0.9	4.4	2.2	10.0	1.1	5.8	11.8	1.1	4.8	9.9
TTE	1.3	2.5	2.8	7.9	0.4	2.7	5.5	0.4	2.5	5.0
BZF	1.3	2.5	4.3	10.3	0.5	3.0	6.0	0.5	2.6	5.4
IBUP	1.6	1.7	1.7	5.7	0.7	2.8	5.8	0.7	1.9	4.1
DCF	5.3	10.4	0.3	10.9	0.7	2.7	5.6	0.7	1.9	2.0
E3	1.4	4.4	1.8	9.8	3.1	10.2	21.3	3.1	5.3	12.3
E1	1.3	4.4	2.5	10.4	3.5	11.1	23.3	3.5	5.1	12.4
E2	1.9	4.3	4.6	13.1	3.1	10.2	21.3	3.1	5.4	12.4
EE2	1.3	4.6	5.1	13.9	4.5	14.1	29.7	4.5	6.3	15.4
DES	1.3	4.4	9.8	21.7	5.3	16.4	34.5	5.3	6.9	17.4
ERT	1.3	2.5	13.9	28.4	4.5	13.9	29.2	4.5	5.2	13.8
FLX	1.4	2.6	6.5	14.3	6.3	19.1	40.2	6.3	68	18.2

