

Supplementary Materials

Organophosphate compounds, polybrominated diphenyl ethers and novel brominated flame retardants in European indoor house dust: use, evidence for replacements and assessment of human exposure.

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Table S1. Labelled surrogate standards added to the samples before extraction (LCS) and instrumental analysis (ISS).

Analytes		Standard Solutions
BFRs and OPs	Surrogate standard solutions (LCS)	BFR-LCS containing: ¹³ C ₁₂ -BDE-3, -15, -28, 47, -77, -99, -100, -126, -153, -154, -169, -183, -197, -205, -207, -209, ¹³ C ₁₄ -DBDPE, ¹³ C ₆ -HBB, ¹³ C ₁₂ -BB-153, ¹³ C ₆ -BTBPE, D ₁₂ -TCEP ^b , D ₁₈ -TCIPP ^b , D ₁₅ -TDCIPP ^b , D ₁₅ -TPHP ^b .
	Internal Standard Spiking Solution (ISS)	BFR-ISS ^a containing: ¹³ C ₁₂ BDE-79, -139, 180, 206 D ₂₇ -TNBP ^b
	Calibration Solutions	BFR-CVS ^a ; OPs including LCS, ISS and natives: TNBP ^b , TCEP ^b , TCIPP ^b , TDCIPP ^b , TPHP ^b , EHDP ^a , TBOEP ^a .

^a Wellington Labs (Canada) and ^b Cambridge Isotope Labs (USA) trading houses

Table S2. Gas chromatographic and mass spectrometric method conditions.

	HRGC	HRMS / LRMS
BFRs	Agilent 6890 GC 15 m DB-5-MS capillary column (0.25 mm id, 0.10 µm film thickness; J&W Scientific) Flow rate: 1 mL/min Injector: 280°C Splitless Oven: 100°C (1 min) - 25°C/min - 250°C - 1.5°C/min - 260°C (7,7min) - 25°C/min - 325°C	Autospec Ultima (HRMS) Transfer line: 280°C Source: 280°C EI (35 eV) 10,000 resolving power (10% valley)
OPs	Agilent 6890 GC 30 m TRB-5MS capillary column (0.25 mm id x 0.25 µm film thickness; Teknokroma) Flow rate: 1 mL/min Injector: 100°C (0.03 min) - 720°C/min - 290°C Pulsed Splitless (50 psi) Oven: 90°C (1 min) - 10°C/min - 310°C (7 min)	Agilent 5973 MSD (LRMS) Transfer line: 300°C Source: 230°C Quadrupole: 150°C EI mode

Table S3. Limits of quantification (LOQ) and concentrations ng/g of SRM 2585 (mean + SD; n=3) in the present study, NIST certificate and other studies.

OPs		LOQ	SRM 2585		Other studies
			NIST 2018 ¹	Present study	
Tri- <i>n</i> -butyl-phosphate	TNBP	21.2	276±14	593±24	190±20, ² 180±20, ³ 269, ⁴ 290±12, ⁵ 169±20, ⁶ 190±10, ⁷ 234±2, ⁸ 260±6, ⁹ 690±26, ¹⁰ 572±46. ¹⁰
Tris(2-chloroethyl)phosphate	TCEP	13.2	925±149	1260±69	730±60, ² 700±170, ³ 792, ⁴ 810±41, ⁵ 788±21, ⁶ 680±60, ⁷ 714±8, ⁸ 1050±1, ⁹ 797±65, ¹⁰ 1861±78, ¹⁰ 720±50, ¹¹ 998. ¹²
Tris(2-chloroisopropyl)phosphate	TCIPP	19.2	1220±350	1238±55	880±140, ² 820±100, ³ 944, ⁴ 750±28, ⁵ 840±19, ⁶ 860±70, ⁷ 778±6, ⁸ 1260±6, ⁹ 1772±67, ¹⁰ 992±70, ¹⁰ 750±120, ¹¹ 665. ¹²
Tris (1-2dicloro-2-propyl)phosphate	TDCIPP	17.5	N.A.	2705±123	2300±280, ² 2000±260, ³ 1556, ⁴ 2500±12, ⁵ 1936±95, ⁶ 3180±70, ⁷ 1808±2, ⁸ 2600±4, ⁹ 2066±260, ¹⁰ 3728±180, ¹⁰ 1900±110, ¹¹ 1550. ¹²
Triphenyl phosphate	TPHP	14.1	1190±130	1169±170	1100±100, ² 990±70, ³ 1104, ⁴ 890±49, ⁵ 1058±85, ⁶ 1139±9, ⁸ 1520±17, ⁹ 944±29, ¹⁰ 1518±155, ¹⁰ 970±50, ¹¹ 1002±53. ¹³
Tris(2-butoxyethyl)phosphate	TBOEP	12.5	N.A.	69023±556	73000±6500, ² 49000±9600, ³ 73464, ⁴ 81000±1850, ⁵ 40107±324, ⁶ 63000±2000, ⁷ 54848±2, ⁸ 86000±1, ⁹ 75000±4200. ¹¹
2-Ethylhexyl diphenyl phosphate	EHDP	17.8	N.A.	2223±504	1000±120, ² 963, ⁴ 1230±23, ⁵ 4711±5203, ¹⁰ 1812±103, ¹⁰ 880±20. ¹¹
PBDEs					
2-Bromodihenyl ether	BDE-1	0.28	N.A.	<0.28	
3-Bromodihenyl ether	BDE-2	0.19	N.A.	<0.19	
4-Bromodihenyl ether	BDE-3	0.16	N.A.	<0.16	
2,6-Bromodihenyl ether	BDE-10	0.01	N.A.	0.78 ^a	
2,4-Bromodihenyl ether	BDE-7	0.01	N.A.	2.57±1.69	
4,4'-Bromodihenyl ether	BDE-15	0.01	N.A.	3.13±0.68	
2,4,6-Tribromodiphenyl ether	BDE-30	0.04	<0.2	<0.04	
2,4',4-Tribromodiphenyl ether	BDE-17	0.01	11.5±1.2	11.6±1.2	
2,4,4'-Tribromodiphenyl ether	BDE-28	0.03	46.9±4.4	44.8±2.17	38.5±1.6, ⁶ 32.8±1.1, ⁷ 51±2, ⁸ 53.6, ¹² 48.12±0.1, ¹⁴ 41.7, ¹⁵ 43.8, ¹⁶ 49.3, ¹⁷ 42±1, ¹⁸ 51.3, ¹⁹ 51.2±9.3, ²⁰ 46.5±14.1. ²⁰
2,2',4,5'&2,3',4',6-Tetrabromodiphenyl ether	BDE-49&71	0.02	53.5±4.2	53.3±3.7	50.5, ¹⁹ 49.5±15, ²⁰ 45.5±8.3. ²⁰
2,2',4,4'-Tetrabromodiphenyl ether	BDE-47	0.01	497±46	498±19	412±10.9, ⁶ 409±11, ⁷ 491±2, ⁸ 334, ¹² 480.1±2.4, ¹⁴ 502, ¹⁵ 451, ¹⁶ 463, ¹⁷ 486±10, ¹⁸ 463, ¹⁹ 425±90, ²⁰ 506±92, ²⁰ 537±26. ²¹
2,3',4,4'-Tetrabromodiphenyl ether	BDE-66	0.02	29.5±6.2	33.2±0.32	31.7, ¹⁹ 31.6±6.7, ²⁰ 29.6±7.2. ²⁰
3,3',4,4'-Tetrabromodiphenyl ether	BDE-77	0.01	N.A.	0.66 ^a	
2,2',4,4',6-Pentabromodiphenyl ether	BDE-100	0.02	145 ± 11	137±25	130±2.3, ⁶ 116±3, ⁷ 146±7, ⁸ 122, ¹² 152.3±0.2 ¹⁴ , 142 ¹⁵ , 126, ¹⁶ 135, ¹⁷ 147±5, ¹⁸ 139, ¹⁹ 128±19, ²⁰ 152±32, ²⁰ 160.7±5.6. ²¹
2,3',4,4',6-Pentabromodiphenyl ether	BDE-119	0.03	<0.2	<0.03	
2,2',4,4',5-Pentabromodiphenyl ether	BDE-99	0.03	892±53	960±13	665±27.6, ⁶ 742±23, ⁷ 773±2, ⁸ 631, ¹² 854±1.0 ¹⁴ , 891 ¹⁵ , 721, ¹⁶ 925, ¹⁷ 803±45, ¹⁸ 842, ¹⁹ 805±146, ²⁰ 796±217, ²⁰ 890±36. ²¹
2,2',3,4,4'-Pentabromodiphenyl ether	BDE-85	0.01	43.8±1.6		35.2, ¹² 38.8, ¹⁵ 41, ¹⁹ 35.5±9.7, ²⁰ 46.8±7.1, ²⁰ 43.3±5.0. ²¹
3,3',4,4',5-Pentabromodiphenyl ether	BDE-126	0.03	N.A.	<0.03	
2,2',4,4',5,6'-Hexabromodiphenyl ether	BDE-154	0.04	83.5±2.0		95±9.2, ⁶ 77.2±2.7, ⁷ 93±7, ⁸ 50.5, ¹² 92.74±0.2, ¹⁴ 88.7, ¹⁵ 70.6, ¹⁶ 80, ¹⁷ 77±5, ¹⁸ 84, ¹⁹ 72.3±13.1, ²⁰ 92.3±22.4, ²⁰ 96±12. ²¹
2,2',4,4',5,5'-Hexabromodiphenyl ether	BDE-153	0.02	119±1.0	119±0.45	114±9.0, ⁶ 97±2, ⁷ 129±10 ⁸ , 104, ¹² 121.2±0.1, ¹⁴ 123, ¹⁵ 118, ¹⁶ 104, ¹⁷ 118±8, ¹⁸ 120, ¹⁹ 102±25, ²⁰ 106±35.3, ²⁰ 127.1±8.8. ²¹
2,2',3,4,4',6-Hexabromodiphenyl ether	BDE-139	0.03	N.A.	9.5±5.14	
2,2',3,4,4',6'-Hexabromodiphenyl ether	BDE-140	0.11	N.A.	<0.11	
2,2',3,4,4',5'-Hexabromodiphenyl ether	BDE-138	0.10	15.2±2.0	15.8±0.92	
2,3,3',4,4',5&3,3',4,4',5,5'-Hexabromodiphenyl ether	BDE-156&169	0.17	<0.2	<0.17	
2,2',3,4,4',6,6'-Heptabromodiphenyl ether	BDE-184	0.01	N.A.	1.1 ^a	
2,2',3,4,4',5',6-Heptabromodiphenyl ether	BDE-183	0.03	43.0±3.5	41.7±1.56	33.5±0.9, ⁶ 32.3±4.8, ⁷ 47±11, ⁸ 40.3, ¹² 44±0.04, ¹⁴ 43.9, ¹⁵ 32.6, ¹⁶ 45.5, ¹⁷ 44±4, ¹⁸ 39.7, ¹⁹ 38.3±21.1, ²⁰ 48.2±8.8, ²⁰ 42.5±5.2. ²¹
2,3,3',4,4',5',6-Heptabromodiphenyl ether	BDE-191	0.01	<0.3	2.1 ^a	
2,2',3,4,4',5,5'-Heptabromodiphenyl ether	BDE-180	0.05	N.A.	3.93±1.08	
2,2',3,3',4,4',6-Heptabromodiphenyl ether	BDE-171	0.02	N.A.	2.1 ^a	
2,2',3,3',4,5',6,6'-Octabromodiphenyl ether	BDE-201	0.01	N.A.	8.1±3.4	
2,2',3,3',4,4',6,6'&2,2',3,4,4',5,6,6'-Octabromodiphenyl ether	BDE-197&204	0.02	N.A.	24.7±9.14	17.5±0.3, ⁶ 32.5±6.9, ²⁰ 34.4±9.4. ²⁰
2,2',3,4,4',5,5',6-Octabromodiphenyl ether	BDE-203	0.04	36.7±6.4	35.5±4.5	20.6±2.2, ⁶ 31.2, ¹⁹ 39.5±10.8, ²⁰ 37.8±6.9, ²⁰ 41.3±4.8. ²¹
2,2',3,3',4,4',5,6'-Octabromodiphenyl ether	BDE-196	0.03	N.A.	22.9±1.1	24±2.1, ⁶ 21.6±5.9, ²⁰ 26.9±8.2. ²⁰

2,3,3',4,4',5,5',6-Octabromodiphenyl ether	BDE-205	0.01	<0.5	<0.01	
2,2',3,3',4,5,5',6,6'-Nonabromodiphenyl ether	BDE-208	0.15	N.A.	105±71	
2,2',3,3',4,4',5,6,6'-Nonabromodiphenyl ether	BDE-207	0.26	N.A.	202±64	147, ¹⁹ 154±79, ²⁰ 164±25. ²⁰
2,2',3,3',4,4',5,5',6-Nonabromodiphenyl ether	BDE-206	0.02	271±42	253±14	102, ¹² 243, ¹⁹ 244±96, ²⁰ 289.6±79. ²⁰
Decabromodiphenyl ether	BDE-209	0.86	2510±190	2564±99	2260±150, ⁶ 2150±231, ⁷ 25266±11, ⁸ 806.1±0.6, ¹⁴ 2456, ¹⁵ 2920, ¹⁶ 2658, ¹⁷ 2971±333, ¹⁸ 2538, ¹⁹ 2486±603, ²⁰ 2706±196. ²¹

NBFRs

Pentabromoethylbenzene	PBEB	0.01	N.A.	5.1±0.9	
Hexabromobenzene	HBB	0.01	N.A.	2.5±0.2	
1,2-Bis(2,4,6-tribromophenoxy)ethane	BTBPE	0.07	N.A.	41.8±9.0	37.5±6.8, ⁶ 39±14, ⁷ 129±4, ⁸ 20, ¹² 54, ¹⁶ 76±4, ¹⁸ 32, ²² <0.8. ²³
Decabromodiphenylethane	DBDPE	0.62	N.A.	<0.62	<20, ²² <7.1, ⁷ N.A., ⁸ N.D., ¹² <10. ²³

^a Quantify (>LOQ) in one sample, N.D.: not detected, N.A.: not available; ¹ National Institute of Standards & Technology (NIST), 2018 [1]; ² Bergh et al., 2012 [2]; ³ Van den Eede et al., 2011 [3]; ⁴ Brandsma et al., 2013 [4]; ⁵ Brandsma et al., 2014 [5]; ⁶ Ali et al., 2012 [6]; ⁷ Van den Eede et al., 2012 [7]; ⁸ Cristale et al., 2018 [8]; ⁹ Luongo et al., 2016 [9]; ¹⁰ Vykoukalová et al., 2017 [10]; ¹¹ Abdallah et al., 2014 [11]; ¹² Schreder et al., 2014 [12]; ¹³ Philips et al., 2017 [13]; ¹⁴ Abafe and Martincigh, 2015 [14]; ¹⁵ Cequier et al., 2014 [15]; ¹⁶ Fromme et al., 2014 [16]; ¹⁷ Wang et al., 2018 [17]; ¹⁸ Cristale et al., 2013 [18]; ¹⁹ Cunha et al., 2010 [19]; ²⁰ Kalachova et al., 2012 [20]; ²¹ Regueiro et al., 2007 [21]; ²² Ali et al., 2011 [22]; ²³ Stapleton et al., 2008 [23].

Table S4. Quantification frequencies (Qf) and median (min.-max.) concentrations (ng/g) obtained in household dust from Belgium, Spain and Italy.

	Total (n=65)		Belgium (n=22)		Spain (n=21)		Italy (n=21)	
TNBP	65%	76.5 (<21.2 - 72856)	45%	14.9 (<21.2 - 3143)	81%	100 (<21.2 - 72856)	68%	73.1 (<21.2 - 2753)
TCEP	92%	241 (<13.2 - 341208)	100%	464 (21.5 - 19785)	86%	88 (<13.2 - 341208)	91%	139 (<13.2 - 1422)
TCIPP	98%	1732 (<19.2 - 208195)	100%	4419 (137 - 208195)	95%	1615 (<19.2 - 29441)	100%	1319 (131 - 31042)
TDCIPP	97%	632 (<17.5 - 23710)	100%	527 (32.5 - 6146)	95%	562 (<17.5 - 12834)	95%	809 (<17.5 - 23710)
TPHP	100%	629 (18 - 25048)	100%	589 (52.8 - 25048)	100%	991 (18 - 23770)	100%	429 (38.9 - 8748)
TBOEP	98%	1492 (<12.5 - 91306)	100%	833 (115 - 7079)	100%	2238 (143 - 21136)	95%	5658 (<12.5 - 91306)
EHDP	97%	492 (<17.8 - 15595)	95%	471 (<17.8 - 4155)	95%	377 (<17.8 - 15595)	100%	608 (66.5 - 4575)
ΣOPs	100%	12788 (429 - 354856)	100%	14091 (544 - 237296)	100%	10012 (530 - 354856)	100%	12109 (429 - 96365)
BDE-1	0%	-	0%	-	0%	-	0%	-
BDE-2	0%	-	0%	-	0%	-	0%	-
BDE-3	0%	-	0%	-	0%	-	0%	-
BDE-10	0%	-	0%	-	0%	-	0%	-
BDE-7	6%	(<0.01 - 0.07)	0%	-	10%	(<0.01 - 0.07)	9%	(<0.01 - 0.03)
BDE-15	5%	(<0.01 - 0.10)	9%	(<0.01 - 0.10)	5%	(<0.01 - 0.04)	0%	-
BDE-30	0%	-	0%	-	0%	-	0%	-
BDE-17	18%	(<0.01 - 0.38)	14%	(<0.01 - 0.38)	24%	(<0.01 - 0.09)	18%	(<0.01 - 0.17)
BDE-28	69%	0.07 (<0.03 - 1.09)	73%	0.06 (<0.03 - 1.09)	71%	0.06 (<0.03 - 0.2)	64%	0.08 (<0.03 - 0.36)
BDE-49&71	63%	0.1 (<0.02 - 3.07)	64%	0.09 (<0.02 - 1.37)	67%	0.12 (<0.02 - 1.5)	59%	0.12 (<0.02 - 3.07)
BDE-47	98%	1.94 (<0.01 - 33.8)	95%	1.96 (<0.01 - 33.8)	100%	1.42 (0.22 - 19.4)	100%	2.74 (0.08 - 23.1)
BDE-66	42%	(<0.02 - 3.72)	50%	(<0.02 - 1.32)	48%	(<0.02 - 3.72)	27%	(<0.02 - 0.40)
BDE-77	9%	(<0.01 - 0.02)	0%	-	9%	(<0.01 - 0.02)	18%	(<0.01 - 0.02)
BDE-100	97%	0.46 (<0.02 - 16.3)	95%	0.44 (<0.02 - 3.25)	95%	0.39 (<0.02 - 16.3)	100%	0.65 (0.03 - 6.83)
BDE-119	11%	(<0.03 - 0.36)	9%	(<0.03 - 0.36)	14%	(<0.03 - 0.09)	9%	(<0.03 - 0.07)
BDE-99	95%	2.8 (<0.03 - 101.9)	95%	2.84 (<0.03 - 13.1)	90%	2.47 (<0.03 - 101.9)	100%	4.97 (0.11 - 46.7)
BDE-85	63%	0.05 (<0.01 - 10.7)	32%	0.01 (<0.01 - 0.18)	81%	0.08 (<0.01 - 10.7)	77%	0.19 (<0.01 - 3.7)
BDE-126	0%	-	0%	-	0%	-	0%	-
BDE-154	69%	1.13 (<0.04 - 63.7)	59%	0.98 (<0.04 - 2.86)	52%	0.41 (<0.04 - 63.7)	95%	2.59 (<0.04 - 25.3)
BDE-153	94%	0.48 (<0.02 - 18.3)	100%	0.44 (0.08 - 2.32)	86%	0.42 (<0.02 - 18.3)	95%	0.78 (<0.02 - 6.47)
BDE-139	14%	(<0.03 - 3.68)	14%	(<0.03 - 0.61)	10%	(<0.03 - 3.68)	18%	(<0.03 - 1.44)
BDE-140	6%	(<0.11 - 2.12)	0%	-	5%	(<0.11 - 2.12)	14%	(<0.11 - 0.50)
BDE-138	8%	(<0.10 - 1.07)	0%	-	5%	(<0.10 - 0.55)	18%	(<0.10 - 1.07)
BDE-156&169	0%	-	0%	-	0%	-	0%	-
BDE-184	42%	0.01 (<0.01 - 30.1)	27%	0.01 (<0.01 - 30.1)	38%	0.01 (<0.01 - 0.2)	59%	0.03 (<0.01 - 0.23)
BDE-183	98%	0.93 (<0.03 - 22.9)	95%	0.71 (<0.03 - 10.7)	100%	1.04 (0.36 - 4.47)	100%	1.11 (0.1 - 22.9)
BDE-191	20%	(<0.01 - 0.36)	14%	(<0.01 - 0.22)	33%	(<0.01 - 0.16)	14%	(<0.01 - 0.36)
BDE-180	20%	(<0.05 - 3.18)	14%	(<0.05 - 3.18)	14%	(<0.05 - 0.38)	41%	(<0.05 - 1.56)
BDE-171	35%	(<0.02 - 0.71)	23%	(<0.02 - 0.64)	38%	(<0.02 - 0.25)	45%	(<0.02 - 0.71)
BDE-201	65%	0.38 (<0.01 - 28.4)	27%	0.01 (<0.01 - 2.23)	71%	0.42 (<0.01 - 9.07)	95%	0.67 (<0.01 - 28.4)
BDE-204&197	82%	0.78 (<0.02 - 108)	55%	0.29 (<0.02 - 4)	95%	0.86 (<0.02 - 9.68)	95%	0.99 (<0.02 - 108)
BDE-203	85%	0.88 (<0.04 - 21.4)	64%	0.52 (<0.04 - 3.9)	90%	0.88 (<0.04 - 21.4)	100%	1.23 (0.07 - 13.5)
BDE-196	82%	0.8 (<0.03 - 17.97)	50%	0.08 (<0.03 - 12.9)	95%	0.81 (<0.03 - 18)	100%	1.36 (0.06 - 8.4)
BDE-205	6%	(<0.01 - 0.23)	14%	(<0.01 - 0.04)	0%	-	5%	(<0.01 - 0.23)
BDE-208	91%	3.29 (<0.15 - 103)	73%	2.43 (<0.15 - 25.1)	100%	3.22 (0.9 - 103)	100%	4.95 (0.17 - 40.4)
BDE-207	94%	5.42 (<0.26 - 216)	82%	4.07 (<0.26 - 97.5)	100%	5.23 (1.32 - 216)	100%	7.68 (0.31 - 65.7)
BDE-206	94%	6.08 (<0.02 - 366)	82%	6.01 (<0.02 - 316)	100%	5.78 (1.25 - 366)	100%	8.25 (0.29 - 61.3)
BDE-209	95%	185 (<0.86 - 12339)	86%	181 (<0.86 - 9854)	100%	151 (15.1 - 12339)	100%	232 (5.36 - 2470)
ΣPBDEs^a	100%	229 (4.32 - 13073)	100%	210 (4.32 - 10322)	100%	176 (25.3 - 13073)	100%	283 (7.7 - 2703)
DBDPE	100%	130 (7.67 - 1921)	100%	142 (8.65 - 1921)	100%	85.6 (23.7 - 514)	100%	119 (7.67 - 722)
BTBPE	78%	1.35 (<0.07 - 26.9)	68%	0.87 (<0.07 - 18.3)	76%	1.58 (<0.07 - 6.49)	91%	1.67 (<0.07 - 26.9)
HBB	77%	0.28 (<0.003 - 2.11)	77%	0.26 (<0.003 - 1.18)	71%	0.22 (<0.003 - 1.77)	82%	0.36 (<0.003 - 2.11)
PBEB	77%	0.03 (<0.003 - 0.25)	64%	0.02 (<0.003 - 0.17)	86%	0.03 (<0.003 - 0.22)	82%	0.06 (<0.003 - 0.25)

^a ΣPBDEs, sum of PBDE with Qf <60 % (bold): BDE-28, -49&71, -47, -100, -99, -85, -154, -153, -184, -183, -201, -204&197, -203, -196, -208, -207, -206 and -209.

Table S5. Applications of organophosphate compounds analyzed in the present study.

	Aryl	Chloroalkyl			Alkyl		
	TPHP	TCEP	TCIPP	TDCIPP	TBOEP	TNBP	EHDP
Plasticizer	X	X	X	X	X	X	X
Lacquer, paint, glue	X	X		X	X	X	
Flame retardant	X	X	X	X	X		
Floor finish wax					X	X	
Anti-foam agent					X	X	
Hydraulic fluid	X					X	X
Industrial processes		X				X	

Data from Marklung et al., 2003 [24], ASTDR, 2012 [25] and Wei et al., 2015 [26].

Table S6. Spearman's Rho correlation matrix. Only data obtained from the questionnaires that obtained significant correlations are shown.

	TPHP	TCEP	TCIPP	TDCIPP	EHDP	TNBP	TBOEP	ΣOPs	BDE-28	BDE-49 & 71	BDE-47	BDE-100	BDE-99	BDE-85	BDE-154	BDE-153	BDE-184
TPHP	1																
TCEP	0.332**	1															
TCIPP	0.427**	0.753**	1														
TDCIPP	0.340**	0.358**	0.526**	1													
EHDP	0.337**	0.320*	0.314*	0.492**	1												
TNBP	0.038	0.426**	0.507**	0.372*	0.154	1											
TBOEP	0.218	0.082	0.119	0.372**	0.402**	-0.141	1										
ΣOPs	0.535**	0.563**	0.656**	0.571**	0.458**	0.356*	0.573**	1									
BDE-28	0.179	0.207	0.199	0.094	0.353*	-0.074	0.090	0.126	1								
BDE-49&71	0.204	0.217	-0.023	0.190	0.192	0.078	0.188	0.129	0.669**	1							
BDE-47	0.333**	0.253	0.207	0.221	0.386**	-0.025	0.166	0.200	0.638**	0.834**	1						
BDE-100	0.289*	0.248	0.208	0.267*	0.387**	0.062	0.222	0.219	0.589**	0.795**	0.957**	1					
BDE-99	0.233	0.211	0.173	0.221	0.368**	-0.043	0.208	0.167	0.583**	0.755**	0.933**	0.958**	1				
BDE-85	0.004	0.304	-0.024	0.145	0.233	0.082	0.096	-0.004	0.502**	0.819**	0.679**	0.787**	0.850**	1			
BDE-154	0.292	0.171	0.263	0.423**	0.357*	0.185	0.297	0.219	0.550**	0.734**	0.796**	0.868**	0.877**	0.863**	1		
BDE-153	0.270*	0.154	0.125	0.338**	0.392**	0.054	.274*	0.190	0.600**	0.774**	0.785**	0.840**	0.854**	0.867**	0.968**	1	
BDE-184	0.217	0.081	0.102	0.154	0.094	0.161	-0.139	0.078	0.339	0.461*	0.303	0.357	0.271	0.508*	0.532*	0.549**	1
BDE-183	0.267*	0.16	0.111	0.264*	0.311*	0.129	0.193	0.096	0.492**	0.595**	0.486**	0.504**	0.516**	0.489**	0.660**	0.744**	0.664**
BDE-201	0.628**	0.335*	0.460**	0.492**	0.407**	-0.177	0.199	0.459**	0.345	0.406*	0.333*	0.231	0.248	0.114	0.347*	0.347*	0.280
BDE-204&197	0.455**	0.333*	0.275*	0.284*	0.464**	0.100	0.19	0.338*	0.541**	0.620**	0.521**	0.511**	0.534**	0.533**	0.567**	0.660**	0.423*
BDE-203	0.530**	0.243	0.229	0.281*	0.335*	-0.016	0.035	0.284*	0.466**	0.635**	0.455**	0.419**	0.374**	0.332*	0.452**	0.579**	0.538**
BDE-196	0.483**	0.245	0.242	0.249	0.311*	-0.021	0.064	0.273*	0.516**	0.659**	0.487**	0.468**	0.414**	0.410*	0.529**	0.622**	0.653**
BDE-208	0.449**	0.262	0.187	0.185	0.269*	-0.053	0.108	0.276*	0.488**	0.666**	0.513**	0.469**	0.415**	0.326*	0.453**	0.525**	0.500**
BDE-207	0.425**	0.219	0.148	0.122	0.234	-0.045	0.068	0.249	0.527**	0.633**	0.464**	0.435**	0.388**	0.300	0.424**	0.530**	0.551**
BDE-206	0.416**	0.206	0.166	0.102	0.126	0.042	0.07	0.273*	0.447**	0.595**	0.446**	0.422**	0.370**	0.335*	0.390**	0.486**	0.516**
BDE-209	0.439**	0.216	0.17	0.164	0.054	0.037	0.146	0.297*	0.436**	0.610**	0.406**	0.384**	0.321*	0.231	0.344*	0.436**	0.396*
ΣPBDEs	0.437**	0.224	0.183	0.143	0.113	0.003	0.125	0.288*	0.515**	0.675**	0.472**	0.455**	0.431**	0.367*	0.444**	0.525**	0.482*
PBEB	0.234	0.245	0.311*	0.309*	0.444**	-0.103	0.369**	0.389**	0.559**	0.535**	0.483**	0.486**	0.489**	0.331	0.447**	0.415**	-0.104
HBB	0.160	-0.162	-0.020	0.079	0.212	-0.476**	0.142	0.003	0.345*	0.164	0.220	0.151	0.143	-0.231	0.068	0.103	0.108
BTBPE	0.161	0.077	0.029	0.131	0.440**	-0.200	0.246	0.106	0.392*	0.514**	0.398**	0.395**	0.444**	0.429*	0.544**	0.614**	0.443*
DBDPE	0.055	0.064	0.22	0.278*	0.245	0.194	0.027	0.102	0.306*	0.129	0.186	0.207	0.205	0.146	0.235	0.317*	0.220
ΣBFRs	0.439**	0.225	0.269*	0.259*	0.219	0.103	0.096	0.331**	0.470**	0.433**	0.382**	0.376**	0.341**	0.277	0.404**	0.466**	0.402*
Children (n) ^a	0.093	-0.076	0.078	0.014	0.118	0.063	-0.001	-0.002	-0.035	0.068	0.061	0.124	0.139	0.086	0.179	0.179	0.097
Floor cov.(%) ^b	0.161	0.303*	0.276*	0.004	-0.060	0.079	0.051	0.186	0.154	0.107	0.003	-0.045	-0.028	-0.045	0.153	0.050	0.333

* p < 0.05; ** p < 0.01; ^a number of children at home; ^b Percentage of floor covered by textiles (%); c-pentaBDE (green), c-octaBDE (blue) and c-decaBDE (red) main PBDE congeners from La Guardia et al 2006 [27].

Table S6 continuation. Spearman`s Rho correlation matrix. Only data obtained from the questionnaires that obtained significant correlations are shown.

	BDE-183	BDE-201	BDE-204 & 197	BDE-203	BDE-196	BDE-208	BDE-207	BDE-206	BDE-209	ΣPBDEs	PBEB	HBB	BTBPE	DBDPE	ΣBFRs	Children (n)	Floor cov.(%)
TPHP																	
TCEP																	
TCIPP																	
TDCIPP																	
EHDP																	
TNBP																	
TBOEP																	
ΣOPs																	
BDE-28																	
BDE-49&71																	
BDE-47																	
BDE-100																	
BDE-99																	
BDE-85																	
BDE-154																	
BDE-153																	
BDE-184																	
BDE-183	1																
BDE-201	0.653**	1															
BDE-204&197	0.895**	0.870**	1														
BDE-203	0.732**	0.873**	0.828**	1													
BDE-196	0.775**	0.855**	0.854**	0.981**	1												
BDE-208	0.600**	0.781**	0.742**	0.910**	0.901**	1											
BDE-207	0.613**	0.763**	0.754**	0.911**	0.915**	0.989**	1										
BDE-206	0.546**	0.703**	0.722**	0.887**	0.888**	0.947**	0.963**	1									
BDE-209	0.491**	0.659**	0.644**	0.819**	0.843**	0.924**	0.938**	0.963**	1								
ΣPBDEs	0.581**	0.737**	0.735**	0.849**	0.869**	0.924**	0.943**	0.962**	0.985**	1							
PBEB	0.256	0.324	0.265	0.228	0.199	0.284	0.257	0.223	0.251	0.344*	1						
HBB	0.127	0.252	0.061	0.211	0.225	0.213	0.180	0.174	0.113	0.196	0.502**	1					
BTBPE	0.750**	0.556**	0.728**	0.587**	0.610**	0.472**	0.459**	0.380**	0.25	0.379**	0.479**	0.293	1				
DBDPE	0.347**	0.349*	0.400**	0.489**	0.515**	0.358**	0.322*	0.427**	0.341**	0.410**	0.309*	0.312*	0.414**	1			
ΣBFRs	0.488**	0.683**	0.693**	0.826**	0.849**	0.795**	0.809**	0.867**	0.863**	0.878**	0.309*	0.268	0.387**	0.690**	1		
Children (n) ^a	0.178	0.194	0.275*	0.289*	0.384**	0.226	0.260*	0.263*	0.172	0.180	-0.122	-0.070	0.215	0.191	0.221	1	
Floor cov.(%) ^b	0.063	0.212	0.106	0.032	0.041	0.133	0.115	0.121	0.154	0.221	-0.006	-0.077	0.001	0.008	0.137	-0.192	1.000

* p < 0.05; ** p < 0.01; ^a number of children at home; ^b Percentage of floor covered by textiles (%); c-pentaBDE (green), c-octaBDE (blue) and c-decaBDE (red) main PBDE congeners from La Guardia et al 2006 [27].

Table S7. Median concentrations in ng/g (number of samples and sampling year) reported in previous studies for house dust collected from Belgium, Italy and Spain.

	Belgium median(n; sampling year)	Spain median, (n, sampling year)	Italy median, (n, sampling year)
TNBP	130 (33; 2008) ¹ ; 101 (8; 2006-10) ²	27 (1; 2006) ² ; 228 (8; ≤ 2006) ³ ; 90 (9; ≤ 2006) ⁴ ; 121 (5; ≤ 2016) ⁵	n.a.
TCEP	230 (33; 2008) ¹ ; 144 (8; 2006-10) ²	82 (1; 2006) ² ; 505 (8; ≤ 2006) ³ ; 900 (9; ≤ 2006) ⁴ ; 1790 (5; ≤ 2016) ⁵ ; 191* (1, 2011) ⁶	n.a.
TCIPP	1380 (33; 2008) ¹ ; 506 (8; 2006-10) ²	185 (1; 2006) ² ; 3800 (8; ≤ 2006) ³ ; 3260 (9; ≤ 2006) ⁴ ; 2623 (5; ≤ 2016) ⁵ ; 1991* (1, 2011) ⁶	n.a.
TDCIPP	360 (33; 2008) ¹ ; 162 (8; 2006-10) ²	124 (1; 2006) ² ; 225 (6; ≤ 2006) ³ ; 7000 (7; ≤ 2006) ⁴ ; 706 (5; ≤ 2016) ⁵ ; 100* (1, 2011) ⁶	n.a.
TPHP	500 (33; 2008) ¹ ; 404 (8; 2006-10) ²	818 (1; 2006) ² ; 1850 (8; ≤ 2006) ³ ; 1300 (9; ≤ 2006) ⁴ ; 1102 (5; ≤ 2016) ⁵ ; 944-734 (9, 2017) ⁷	n.a.
TBOEP	2030 (33; 2008) ¹ ; 3335(8; 2006-10) ²	50 (1; 2006) ² ; 9350 (8; ≤ 2006) ³ ; 3600 (9; ≤ 2006) ⁴ ; 1790 (5; ≤ 2016) ⁵	n.a.
EHDP	n.a.	1262 (5; ≤ 2016) ⁵	n.a.
BDE-28	0.16 (8; 2006-10) ² ; 0.4 (45; 2008) ⁸ ; 0.20 (30; 2004) ⁹	0.13 (1; 2006) ² ; <0.3 (4; 2003) ¹⁰ ; nd (5; ≤ 2016) ⁵ ; 0.30 (34; 2004) ⁹	<0.3 (1; 2003) ¹⁰ ; 0.35 (14; 2004) ⁹
BDE-47	4.70 (8; 2006-10) ² ; 8.1 (45; 2008) ⁸ ; 5.75 (30; 2004) ⁹ ; 8 (43;2008) ¹¹	2.29 (1; 2006) ² ; 13 (4; 2003) ¹⁰ ; 7.3 (5; ≤ 2016) ⁵ ; 4.20 (34; 2004) ⁹ ; 11.5 (6; <2006) ¹²	23 (1; 2003) ¹⁰ ; 5.85 (14; 2004) ⁹
BDE-100	1.54 (8; 2006-10) ² ; 1.1 (45; 2008) ⁸ ; 1.35 (30; 2004) ⁹	1.01 (1; 2006) ² ; nd (5; ≤ 2016) ⁵ ; 0.65 (34; 2004) ⁹ ; 2.05 (6; <2006) ¹²	1.2 (14; 2004) ⁹
BDE-99	7.75 (8; 2006-10) ² ; 8.9 (45; 2008) ⁸ ; 7.6 (30; 2004) ⁹ ; 9 (43;2008) ¹¹	7.49 (1; 2006) ² ; 17.5 (4; 2003) ¹⁰ ; 4.9 (34; 2004) ⁹ ; 5.9 (5; ≤ 2016) ⁵ ; 10.1 (6; <2006) ¹²	36 (1; 2003) ¹⁰ ; 7.75 (14; 2004) ⁹
BDE-154	0.71 (8; 2006-10) ² ; 0.9 (45; 2008) ⁸ ; 0.70 (30; 2004) ⁹	0.68 (1; 2006) ² ; nd (5; ≤ 2016) ⁵ ; 0.65 (34; 2004) ⁹ ; 3.24 (6; <2006) ¹²	0.95 (14; 2004) ⁹
BDE-153	2.14 (8; 2006-10) ² ; .2.2 (45; 2008) ⁸ ; 1.10 (30; 2004) ⁹	1.87 (1; 2006) ² ; 7.9 (5; ≤ 2016) ⁵ ; 1.50 (34; 2004) ⁹ ; 2.96 (6; <2006) ¹²	1.80 (14; 2004) ⁹
BDE-183	2.49 (8; 2006-10) ² ; 1.4 (45; 2008) ⁸ ; .2.6 (30; 2004) ⁹ ; 2 (43;2008) ¹¹	1.3 (1; 2006) ² ; 33.4 (5; ≤ 2016) ⁵ ; 2.2 (34; 2004) ⁹ ; 21.7 (6; <2006) ¹²	1.90 (14; 2004) ⁹
BDE-204&197	0.9 (45; 2008) ⁸ ; 1.4 (43;2008) ¹¹		
BDE-203			
BDE-196	2.3 (45; 2008) ⁸	7.16 (6; <2006) ¹²	
BDE-207		32.5 (6; <2006) ¹²	
BDE-209	220 (8; 2006-10) ² ; 106 (16;2007) ¹³ ; 313 (45; 2008) ⁸ ; 80.5 (30; 2004) ⁹ ; 317 (43;2008) ¹¹	105 (1; 2006) ⁷ ; 425 (4; 2003) ¹⁰ ; 3526 (5; ≤ 2016) ⁵ ; 66.3 (34; 2004) ⁹ ; 183 (6; <2006) ¹²	1600(1; 2003) ¹⁰ ; 154 (14; 2004) ⁹
BTBPE	2.20 (8; 2006-10) ² ; 2 (39; 2008) ¹¹	1.51 (1; 2006) ² ; 21.4 (5; ≤ 2016) ⁵	
DBDPE	87 (8; 2006-10) ² ; 153 (39; 2008) ¹¹	5820 (1; 2006) ² ; 307 (5; ≤ 2016) ⁵	

n.a. = not available due to <50% detectable measures; *mean; Data from: ¹ Van der Ede et al 2011 [3]; ² Van der Ede 2012 [7]; ³ García et al 2007 [28]; ⁴ García et al 2007 [29]; ⁵ Cristale et al 2016 [30]; ⁶ Quintana et al 2017 [31]; ⁷ Björnsdotter et al 2018 [32]; ⁸ D'Hollander et al 2010 [33]; ⁹ Fabrellas et al 2005 [34]; ¹⁰ Santillo et al 2003 [35]; ¹¹ Ali et al 2011 [22]; ¹² Regueiro et al 2007 [21]; ¹³ Roosens et al 2009 [36].

Table S8. Estimated daily intakes (ng/kg bw/day) via house dust ingestion (EDI_{ingestion}), dermal absorption (EDI_{dermal}) and total (EDI_{total}, sum of EDI_{ingestion} and EDI_{dermal}) calculated for toddlers and adults at central (P50) and upper (P95) scenarios. Daily reference dose (RfD) in ng/kg bw/day.

	Toddlers			Adults			RfD
	EDI _{ingestion}	EDI _{dermal}	EDI _{total}	EDI _{ingestion}	EDI _{dermal}	EDI _{total}	
	Central - Upper	Central - Upper	Central - Upper	Central - Upper	Central - Upper	Central - Upper	
TPHP	1.96E+00 - 8.57E+01	6.84E-01 - 1.50E+01	2.65E+00 - 1.01E+02	1.01E-01 - 6.60E+00	3.95E-02 - 8.63E-01	1.40E-01 - 7.47E+00	7000 ¹ - 70000 ²
TCEP	7.52E-01 - 2.34E+01	4.32E-01 - 6.72E+00	1.18E+00 - 3.01E+01	3.86E-02 - 1.80E+00	2.49E-02 - 3.88E-01	6.35E-02 - 2.19E+00	2200 ¹ - 22000 ²
TCIPP	5.40E+00 - 1.77E+02	2.77E+00 - 4.53E+01	8.17E+00 - 2.22E+02	2.77E-01 - 1.36E+01	1.60E-01 - 2.61E+00	4.37E-01 - 1.62E+01	8000 ¹ - 80000 ²
TDCIPP	1.97E+00 - 3.76E+01	5.26E-01 - 5.01E+00	2.50E+00 - 4.26E+01	1.01E-01 - 2.89E+00	3.04E-02 - 2.89E-01	1.32E-01 - 3.18E+00	1500 ¹ - 15000 ²
EHDP	1.53E+00 - 2.21E+01	5.34E-01 - 3.86E+00	2.07E+00 - 2.60E+01	7.86E-02 - 1.70E+00	3.09E-02 - 2.23E-01	1.09E-01 - 1.93E+00	
TNBP	2.38E-01 - 9.53E+00	8.32E-02 - 1.66E+00	3.22E-01 - 1.12E+01	1.22E-02 - 7.34E-01	4.80E-03 - 9.60E-02	1.70E-02 - 8.30E-01	2400 ¹ - 24000 ²
TBOEP	4.65E+00 - 1.37E+02	1.62E+00 - 2.38E+01	6.27E+00 - 1.61E+02	2.39E-01 - 1.05E+01	9.36E-02 - 1.38E+00	3.32E-01 - 1.19E+01	1500 ¹ - 15000 ²
ΣOPs	1.65E+01 - 4.92E+02	6.65E+00 - 1.01E+02	2.31E+01 - 5.93E+02	8.47E-01 - 3.79E+01	3.84E-01 - 5.85E+00	1.23E+00 - 4.37E+01	
BDE-28	2.18E-04 - 2.07E-03	1.89E-05 - 8.99E-05	2.37E-04 - 2.16E-03	1.12E-05 - 1.59E-04	1.09E-06 - 5.19E-06	1.23E-05 - 1.65E-04	100 ³
BDE-49&71	3.13E-04 - 8.01E-03	1.83E-05 - 2.34E-04	3.31E-04 - 8.25E-03	1.61E-05 - 6.17E-04	1.06E-06 - 1.35E-05	1.71E-05 - 6.31E-04	
BDE-47	6.04E-03 - 1.17E-01	3.53E-04 - 3.41E-03	6.39E-03 - 1.20E-01	3.10E-04 - 8.99E-03	2.04E-05 - 1.97E-04	3.30E-04 - 9.19E-03	100 ^{3,4}
BDE-100	1.44E-03 - 3.62E-02	5.80E-05 - 7.29E-04	1.50E-03 - 3.70E-02	7.41E-05 - 2.79E-03	3.35E-06 - 4.21E-05	7.75E-05 - 2.83E-03	2000 ⁴
BDE-99	8.72E-03 - 2.01E-01	3.51E-04 - 4.03E-03	9.07E-03 - 2.05E-01	4.48E-04 - 1.55E-02	2.03E-05 - 2.33E-04	4.68E-04 - 1.57E-02	100 ⁴
BDE-85	1.64E-04 - 1.75E-02	6.59E-06 - 3.51E-04	1.70E-04 - 1.78E-02	8.41E-06 - 1.35E-03	3.81E-07 - 2.03E-05	8.79E-06 - 1.37E-03	2000 ⁴
BDE-154	3.53E-03 - 9.47E-02	6.45E-05 - 8.64E-04	3.60E-03 - 9.55E-02	1.81E-04 - 7.29E-03	3.73E-06 - 4.99E-05	1.85E-04 - 7.34E-03	100 ³
BDE-153	1.50E-03 - 2.83E-02	2.73E-05 - 2.58E-04	1.52E-03 - 2.86E-02	7.68E-05 - 2.18E-03	1.58E-06 - 1.49E-05	7.84E-05 - 2.20E-03	200 ^{3,4}
BDE-184	2.13E-05 - 1.15E-03	3.88E-07 - 1.05E-05	2.17E-05 - 1.16E-03	1.09E-06 - 8.87E-05	2.24E-08 - 6.07E-07	1.11E-06 - 8.93E-05	
BDE-183	2.91E-03 - 2.77E-02	5.32E-05 - 2.53E-04	2.97E-03 - 2.80E-02	1.50E-04 - 2.14E-03	3.07E-06 - 1.46E-05	1.53E-04 - 2.15E-03	
BDE-201	1.19E-03 - 2.06E-02	1.22E-06 - 1.06E-05	1.19E-03 - 2.06E-02	6.11E-05 - 1.59E-03	7.05E-08 - 6.11E-07	6.11E-05 - 1.59E-03	3000 ⁴
BDE204&197	2.44E-03 - 3.23E-02	2.50E-06 - 1.66E-05	2.44E-03 - 3.23E-02	1.25E-04 - 2.49E-03	1.45E-07 - 9.56E-07	1.25E-04 - 2.49E-03	6000 ⁴
BDE-203	2.73E-03 - 4.72E-02	2.80E-06 - 2.42E-05	2.73E-03 - 4.73E-02	1.40E-04 - 3.64E-03	1.62E-07 - 1.40E-06	1.40E-04 - 3.64E-03	3000 ⁴
BDE-196	2.49E-03 - 5.15E-02	2.56E-06 - 2.64E-05	2.50E-03 - 5.15E-02	1.28E-04 - 3.97E-03	1.48E-07 - 1.53E-06	1.28E-04 - 3.97E-03	3000 ⁴
BDE-208	1.02E-02 - 1.55E-01	1.05E-05 - 7.96E-05	1.03E-02 - 1.55E-01	5.26E-04 - 1.20E-02	6.07E-07 - 4.60E-06	5.27E-04 - 1.20E-02	
BDE-207	1.69E-02 - 3.78E-01	1.73E-05 - 1.94E-04	1.69E-02 - 3.78E-01	8.67E-04 - 2.91E-02	1.00E-06 - 1.12E-05	8.68E-04 - 2.91E-02	
BDE-206	1.89E-02 - 3.79E-01	1.94E-05 - 1.94E-04	1.90E-02 - 3.79E-01	9.73E-04 - 2.92E-02	1.12E-06 - 1.12E-05	9.74E-04 - 2.92E-02	
BDE-209	5.75E-01 - 1.53E+01	5.90E-04 - 7.83E-03	5.76E-01 - 1.53E+01	2.95E-02 - 1.18E+00	3.41E-05 - 4.52E-04	2.96E-02 - 1.18E+00	7000 ^{1,3,4}
ΣPBDEs	6.55E-01 - 1.69E+01	1.60E-03 - 1.86E-02	6.56E-01 - 1.69E+01	3.36E-02 - 1.30E+00	9.23E-05 - 1.07E-03	3.37E-02 - 1.30E+00	
DBDPE	4.04E-01 - 3.19E+00	4.14E-04 - 1.64E-03	4.04E-01 - 3.19E+00	2.07E-02 - 2.46E-01	2.39E-05 - 9.44E-05	2.07E-02 - 2.46E-01	333333 ²
BTBPE	4.20E-03 - 5.88E-02	7.66E-05 - 5.36E-04	4.27E-03 - 5.93E-02	2.15E-04 - 4.53E-03	4.43E-06 - 3.10E-05	2.20E-04 - 4.56E-03	243000 ²
HBB	8.85E-04 - 7.28E-03	5.18E-05 - 2.13E-04	9.37E-04 - 7.49E-03	4.54E-05 - 5.61E-04	2.99E-06 - 1.23E-05	4.84E-05 - 5.73E-04	2000 ⁵
PBEB	8.25E-05 - 1.10E-03	4.83E-06 - 3.23E-05	8.73E-05 - 1.14E-03	4.24E-06 - 8.51E-05	2.79E-07 - 1.86E-06	4.52E-06 - 8.69E-05	
ΣBFRs	1.06E+00 2.01E+01	2.14E-03 2.10E-02	1.07E+00 2.01E+01	5.46E-02 1.55E+00	1.24E-04 1.21E-03	5.47E-02 1.55E+00	

¹ Van den Eede et al.,2011 [3];² Ali et al., 2012 [6];³ Roosens et al., 2010 [37];⁴ U.S. EPA, 2017 [38];⁵ U. S. EPA 1987 [39].

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