Environmental Science: Processes & Impacts

Electronic Supplementary Information

General baseline toxicity QSAR for nonpolar, polar and ionisable chemicals and their mixtures in the bioluminescence inhibition assay with *Aliivibrio fischeri*

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S1. Additional information on the Microtox assay

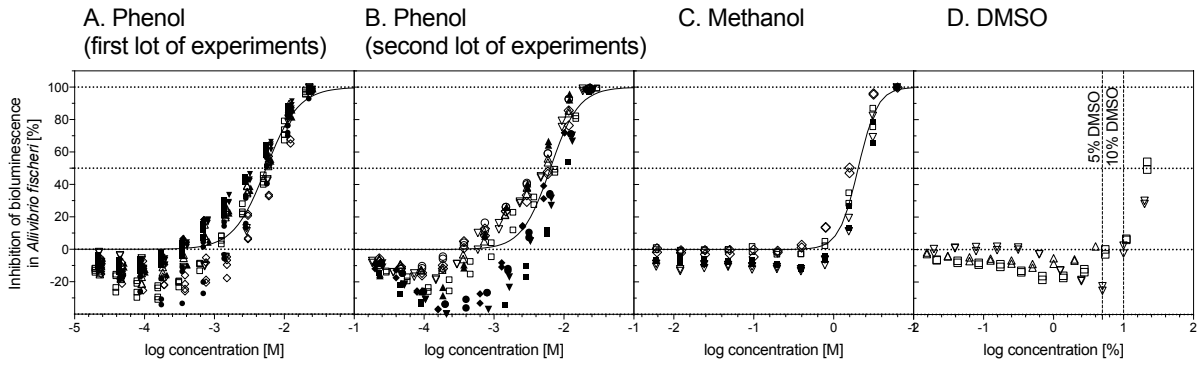

Fig. S1 Reference compound phenol as a measure of repeatability and robustness of the 384-well plate set up of the Microtox assay. A./B. Phenol controls. C. Solvent methanol. D. Solvent DMSO (for mixtures with Tecan D300 dosing experiment only).

S2. Additional information on the chemicals

Table S1 Additional information on the training set of baseline toxicants (complementing Table 1 of main manuscript). The data are sorted according to increasing logK_{lipw}.

	Molecular formula	MW [g/mol]	CAS	$K_{water/air}$ [L_{air}/L_{water}]	Provider
1-Butanol	C4H10O	74.12	71-36-3	2291	Sigma-Adrich
2-Butoxyethanol	C6H14O2	118.18	111-76-2	47863	Sigma-Adrich
3-Pentanol	C5H12O	88.15	584-02-1	1862	Sigma-Adrich
1-Hexanol	C6H7N	93.13	62-53-3	19055	Sigma-Adrich
Aniline	C6H14O	102.18	111-27-3	1318	Sigma-Adrich
Nitrobenzene	C6H5NO2	123.1	98-95-3	977	Sigma-Adrich
3-Nitroaniline	C6H6N2O2	138.13	99-09-2	2630268	Sigma-Adrich
2-Nitrotoluene	C7H7NO2	137.14	88-72-2	603	Sigma-Adrich
2-Allylphenol	H2C=CHCH2C6H4OH	134.18	1745-81-9	28840	Sigma-Adrich
2-Phenylphenol	C12H10O	170.21	90-43-7	2290868	Sigma-Adrich

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	Molecular formula	MW [g/mol]	CAS	$K_{water/air}$ [L_{air}/L_{water}]	Provider
2,4,5-Trichloroaniline	C6H4Cl3N	196.46	636-30-6	2512	Sigma-Adrich
4-n-Pentylphenol	C11H16O	164.25	14938-35-3	18197	Sigma-Adrich

Table S2 Additional information on the set of baseline toxicants, their octanol- and liposome-water partition coefficients logK_{ow} and water solubility C_w^{sat}. The data are grouped in those with EC_{50} values and those below the solubility cut-off and within each group are sorted according to increasing logK_{lipw}. EC_{50} and log K_{lipw} are listed in the main manuscript, Table 2.

Chemical name	CAS #	Provider	logK_{lipw}	Data source[a]	logK_{ow}	Data source	log C_w^{sat} (GSE)[b] (M)	log C_w^{sat} (M)	Data source	C_w^{sat} (salt)
Group 1: Chemicals of set that fulfilled criteria for solubility cut-off and had measurable EC_{50} values										
Cotinine	486-56-6	Bertin pharma	-0.57	PP-LFER	0.07	PhysProp, exp.	0.43	0.50	PhysProp fragment method	0.40
Caffeine	58-08-2	Sigma Aldrich	0.28	PP-LFER	-0.07	PhysProp	0.57	-0.95	PhysProp exp. Yalkowski (1992)	-1.05
Thiacloprid	111988-49-9	Fluka Pestanal	1.19	PP-LFER	1.29	PP-LFER	-0.79	-1.21	PhysProp fragment method	-1.31
Atrazine	1912-24-9	Bertin pharma	2.14	PP-LFER	2.61	PhysProp	-2.11	-3.79	PhysProp exp. Ward (1968)	-3.89
10,11-Dihydro-10-hydroxycarbamazepine	29331-92-8	Fluka Analytical Standard	2.67	PP-LFER	2.26	PP-LFER	-1.76	-2.04	PhysProp fragment method	-2.14
Metolachlor	51218-45-2	Fluka Pestanal	2.78	PP-LFER	3.13	PhysProp	-2.63	-2.73	PhysProp exp. Wauchope (1992)	-2.83
Carbamazepine	298-46-4	Fluka Pestanal	3.10	PP-LFER	2.45	PhysProp	-1.95	-3.89	PhysProp fragment method	-3.99
Diuron	330-54-1	Fluka	3.19	PP-LFER	2.68	PhysProp	-2.18	-3.74	PhysProp exp. Tomlin (1994)	-3.84
2-(Methylthio)-benzothiazole	615-22-5	Aldrich	3.26	PP-LFER	3.15	PhysProp	-2.65	-3.16	Physpro. Exp. Brownlee (1992)	-3.26
Tebuconazole	107534-96-3	Fluka Pestanal	3.31	PP-LFER	3.70	PhysProp	-3.20	-3.93	PhysProp exp. Tomlin (1994)	-4.03
Methiocarb	2032-65-7	Fluka Pestanal	3.54	PP-LFER	2.92	PhysProp	-2.42	-3.92	PhysProp exp. Tomlin (1994)	-4.02
Bisphenol A	80-05-7	Aldrich	3.65	(Kwon *et al.*, 2006)	3.32	PhysProp	-2.82	-3.28	PhysProp exp. Dorn (1987)	-3.38
Cyprodinil	121552-61-2	Fluka Pestanal	3.83	PP-LFER	4.00	PhysProp	-3.50	-4.24	PhysProp exp. Tomlin (1994)	-4.34
Flusilazole	85509-19-9	Fluka Pestanal	4.21	PP-LFER	3.70	PhysProp	-3.20	-3.77	PhysProp exp. Tomlin (1994)	-3.87
Chlorophene	120-32-1	Aldrich	4.31	PP-LFER	3.60	PhysProp	-3.10	-3.17	PhysProp exp. Werner (1983)	-3.27
Chlorpyrifos-methyl	5598-13-0	Fluka Pestanal	4.55	PP-LFER	4.31	PhysProp	-3.81	-4.83	PhysProp exp. Chiou (1977)	-4.93
Group 2: Chemicals of set that did not pass criteria for solubility cut-off and had no measurable toxicity										
Carbendazim	10605-21-7	Fluka Pestanal	1.70	PP-LFER	1.52	PhysProp	-1.02	-3.82	PhysProp exp. Tomlin (1994)	-3.92
Oxazepam	604-75-1	Cerilliant	1.83	PP-LFER	2.24	PhysProp	-1.74	-2.45	PhysProp fragment method	-2.55
Fipronil	120068-37-3	Fluka Pestanal	2.50	PP-LFER	4.00	PhysProp	-3.50	-5.36	PhysProp exp. Tomlin (1994)	-5.46
Terbutylazine	5915-41-3	Fluka Pestanal	2.97	PP-LFER	3.21	PhysProp	-2.71	-4.43	PhysProp exp. Tomlin (1994)	-4.53
Diazinon	333-41-5	Fluka Pestanal	3.17	PP-LFER	3.81	PhysProp	-3.31	-3.88	PhysProp exp. Sharom (1980A)	-3.98
Tris(1,3-dichlorisopropyl)-phosphat (TDCPP)	13674-87-8	Fluka Analytical Standard	3.17	PP-LFER	3.65	PhysProp	-3.15	-4.79	PhysProp exp. Yalkowski (1992) (1992)	-4.89
Irgarol	28159-98-0	Fluka Pestanal	3.19	PP-LFER	3.38	PP-LFER	-2.88	-4.10	PhysProp fragment method	-4.20
Picoxystrobin	117428-22-5	Fluka Pestanal	3.22	PP-LFER	3.56	PP-LFER	-3.06	-3.72	PhysProp fragment method	-3.82
Lenacil	2164-08-1	Fluka Pestanal	3.32	PP-LFER	3.22	PP-LFER	-2.72	-4.59	PhysProp exp. Yalkowski (1992) (1992)	-4.69
Chlorpyrifos-ethyl	2921-88-2	Fluka Pestanal	3.42	PP-LFER	4.96	PhysProp	-4.46	-5.50	PhysProp exp. Yalkowski (1992) (1992)	-5.60
Naphthalene	91-20-3	Fluka Analytical Standard	3.44	PP-LFER	3.30	PhysProp	-2.80	-3.62	PhysProp exp. Pearlman(1984)	-3.72

Chemical name	CAS #	Provider	logK_{lipw}	Data source[a]	logK_{ow}	Data source	log C_w^{sat} (GSE) [b] (M)	log C_w^{sat} (M)	Data source	C_w^{sat} (salt)
Flutamide	13311-84-7	Sigma-Aldrich	3.57	PP-LFER	3.35	PhysProp	-2.85	-4.23	PhysProp fragment method	-4.33
Propiconazole	60207-90-1	Fluka Pestanal	3.81	PP-LFER	3.72	PhysProp	-3.22	-3.49	PhysProp exp. Shiu (1990)	-3.59
Epoxyconazole	133855-98-8	Fluka Pestanal	4.08	PP-LFER	3.44	PhysProp	-2.94	-4.70	PhysProp exp. Tomlin (1994)	-4.80
Prazepam	2955-38-6	Sigma-Aldrich	4.46	PP-LFER	3.73	PhysProp	-3.23	-6.48	PhysProp fragment method	-6.58
Triphenyl phosphate	115-86-6	Aldrich	4.59	PP-LFER	4.59	PhysProp	-4.09	-5.23	PhysProp. Exp. Saeger (1979)	-5.33
Boscalid	188425-85-6	Fluka Pestanal	4.59	PP-LFER	2.96	PhysProp	-2.46	-5.80	PhysProp fragment method	-5.90
Pendimethalin	40487-42-1	Fluka Pestanal	4.80	PP-LFER	5.18	PhysProp	-4.68	-5.02	PhysProp fragment method	-5.12
Fenofibrate	49562-28-9	Bertin Pharma	4.97	PP-LFER	5.14	PP-LFER	-4.64	-5.64	PhysProp fragment method	-5.74
Quinoxyfen	124495-18-7	Fluka Pestanal	4.98	PP-LFER	4.66	PhysProp	-4.16	-4.81	PhysProp fragment method	-4.91
Penconazole	66246-88-6	Fluka Pestanal	5.04	PP-LFER	4.93	PP-LFER	-4.43	-3.59	PhysProp exp. Tomlin (1994)	-3.69
Anthracene	120-12-7	Fluka Analytical Standard	5.12	PP-LFER	4.45	PhysProp	-3.95	-6.61	Physporp exp. May (1983)	-6.71
Triclocarban	101-20-2	Sigma-Aldrich	5.23	PP-LFER	4.54	PP-LFER	-4.04	-7.11	PhysProp fragment method	-7.21
Fluoranthene	206-44-0	Fluka Analytical Standard	5.41	PP-LFER	5.16	PhysProp	-4.66	-5.89	PhysProp exp. Mackay (1977)	-5.99
Tris(methylphenyl)phosphate (TMPP)	1330-78-5	Fluka Analytical Standard	5.59	PP-LFER	5.82	PP-LFER	-5.32	-6.09	PhysProp exp.	-6.19
4-Nonylphenol	104-40-5	Fluka Pestanal	5.85	(Kwon *et al.*, 2006)	5.76	PhysProp	-5.26	-4.50	PhysProp exp. Yalkowski (1992)	-4.60
Tris(3,5-dimethylphenyl)phosphate (T35DMPP)	25653-16-1	Grey-hound Chromatography	6.45	PP-LFER	7.01	PP-LFER	-6.51	-5.66	PhysProp exp. Saeger (1979)	-5.76
Benzo(b)fluoranthene	205-99-2	Sigma-Aldrich	6.89	(van der Heijden and Jonker, 2009)	5.78	PhysProp	-5.28	-8.23	PhysProp exp. Yalkowski (1992)	-8.33
Benzo(k)fluoranthene	207-08-9	Sigma-Aldrich	6.92	(van der Heijden and Jonker, 2009)	6.11	PhysProp	-5.61	-8.50	PhysProp exp. Pearlman (1984)	-8.60
Benzo(a)pyrene	50-32-8	Sigma-Aldrich	7.05	(van der Heijden and Jonker, 2009)	6.13	PhysProp	-5.63	-7.28	PhysProp fragment method	-7.38
Indeno(1,2,3-c,d)pyrene	193-39-5	Sigma-Aldrich	7.38	(van der Heijden and Jonker, 2009)	6.64	PP-LFER	-6.14	-8.01	PhysProp fragment method	-8.11
Benzo(g,h,i)perylene	191-24-2	Sigma-Aldrich	7.66	(van der Heijden and Jonker, 2009)	6.83	PP-LFER	-6.33	-9.18	PhysProp fragment method	-9.28
Di(2-ethylhexyl)phthalate (DEHP)	117-81-7	Fluka Pestanal	7.79	PP-LFER	7.60	PhysProp	-7.10	-8.11	(Mitsunobu and Takahashi, 2006)	-8.21

[a]Calculated with the PP-LFER equation for logK_{lipw} = 0.48 + 0.55L – 0.95 S – 0.05 A -4.02 B + 1.65 V(Endo *et al.*, 2011) and chemical parameters taken from the UFZ-LSER database v 3.1 (www.ufz.de/lserd) (Endo *et al.*, 2015). [b]Generalised solubility equation. [c]PhysProp database accessed via Episuite (U.S. EPA, 2009). The references are found in the PhysProp database and are added her only for orientation. For those chemicals without experimental solubility, the values from the fragment method in PhysProp were preferred over the K_{ow} prediction because it generally delivered more conservative estimates.

Table S3 Additional information on the ionisable chemicals, complementing Table 3 in the main manuscript. The data are sorted according to increasing logD_{lipw}(pH7)

Chemical name	Provider	CAS #	log K_{ow} [L/L] 25°C	Reference[a,b]	pK_a	Reference[c]	log$K_{lipw\ neutral}$ (25°C)	Reference	log$K_{lipw\ ion}$	Reference
Anionic and neutral/anionic chemicals										
Theophyllin	Alfa Aesar	58-55-9	-0.04	PhysProp exp. Sangster 1993	8.81	PhysProp exp. Kortum (1961)	-0.37	COSMO*mic*	1.06	COSMO*mic*
Salicylic acid	Sigma-Aldrich	69-72-7	2.26	PhysProp, exp. Hansch, (1995)	2.97	PhysProp exp. Serjeant (1979)	2.50	(Ottiger and Wunderli-Allenspach, 1997)	1.04	(Ottiger and Wunderli-Allenspach, 1997)
1,2-Benzisothiazolinone	Sigma-Aldrich	2634-33-5	0.65	PP-LFER	7.3	(SCCNFP, 2004)	1.19	PP-LFER	1.80	COSMO*mic*
Sulfadimidin / Sulfamethazin	Sigmal-Aldrich	57-68-1	0.89	PhysProp exp. BioByte (1995)	7.59	PhysProp, exp. Sangster (1994)	1.53	PP-LFER	1.61	COSMO*mic*
Sulfamethoxazole	Fluka Analytical Standard	723-46-6	0.89	PhysProp exp. Hansch (1995)	5.70	(Huber *et al.*, 2003)	1.26	PP-LFER	1.56	COSMO*mic*
Warfarin	Sigma-Aldrich	81-81-2	2.7	PhysProp exp. Hansch (1995)	4.9	(Ottiger and Wunderli-Allenspach, 1997)	3.39	(Ottiger and Wunderli-Allenspach, 1997)	1.4	(Ottiger and Wunderli-Allenspach, 1997)
2,4-dichlorophenoxyacetic acid	Bertin Pharma	94-75-7	2.81	PhysProp, exp.	2.58	(Barzanti *et al.*, 2007)	3.60	(Barzanti *et al.*, 2007)	1.70	(Barzanti *et al.*, 2007)
Mecoprop	Fluka Pestanal	93-65-2	3.20	PhysProp exp. Tomlin (1997)	3.1	(Cessna and Grover, 1978)	2.78	PP-LFER	1.77	COSMO*mic*
Ketoprofen	Sigma	22071-15-4	3.12	PhysProp, exp. Sangster (1993)	4.25	(Bouchard *et al.*, 2002)	3.78	PP-LFER	1.69	COSMO*mic*
Clofibric acid	Fluka Analytical Standard	882-09-7	2.57	PhysProp exp. Hansch (1995)	2.5	(Drillia *et al.*, 2005)	2.62	PP-LFER	1.83	COSMO*mic*
Bezafibrate	Fluka Analytical Standard	41859-67-0	4.07	PP-LFER	3.6	(Huber *et al.*, 2003)	4.25	PP-LFER	1.81	COSMO*mic*
2,4-Dinitrophenol (DNP)	Fluka Analytical Standard	51-28-5	1.67	(Schwarzenbach *et al.*, 1988)	3.9	(Schwarzenbach *et al.*, 1988)	2.64	(Escher *et al.*, 2000)	1.90	(Escher *et al.*, 2000)
Ibuprofen	Bertin Pharma	15687-27-1	3.97	PhysProp exp. Avdeef (1997)	4.45	(Avdeef *et al.*, 1998)	3.80	(Avdeef *et al.*, 1998)	1.81	(Avdeef *et al.*, 1998)
Naproxen	Cayman Chemical Company	22204-53-1	3.18	PhysProp exp. Hansch. (1995)	4.18	(Bouchard *et al.*, 2002)	3.84	PP-LFER	1.92	COSMO*mic*
Diclofenac	Cayman Chemical Company	15307-86-5	4.51	PhysProp exp. Avdeef (1997)	3.99	(Avdeef *et al.*, 1998)	4.45	(Avdeef *et al.*, 1998)	2.64	(Avdeef *et al.*, 1998)
Mefenamic acid	Fluka	61-68-7	5.12	PhysProp exp. Hansch (1995)	4.2	PhysProp, exp. Sangster (1994)	5.39	PP-LFER	2.67	COSMO*mic*
Torasemide	Fluka	56211-40-6	3.37	PhysProp	6.68	(Masereel,	3.48	PP-LFER	2.23	COSMO*mic*

Chemical name	Provider	CAS #	log K_{ow} [L/L] 25°C	Reference[a,b]	pK_a	Reference[c]	log$K_{lipw\ neutral}$ (25°C)	Reference	log$K_{lipw\ ion}$	Reference
				exp. BioByte (2009)		1993)				
Cholic acid	Alfa Aesar	81-25-4	2.02	PhysProp exp. Roda (1990)	4.98	PhysProp exp. Serjeant (1979)	5.09	PP-LFER	1.68	COSMO*mic*
Trifloxystrobin	Fluka Pestanal	252913-85-2	5.37	PP-LFER	4.7	ACD/pKa GALAS	4.79	PP-LFER	3.04	COSMO*mic*
Dinoseb	Fluka Pestanal	88-85-7	3.56	PhysProp	4.62	(Schwarzenbach *et al.*, 1988)	3.96	(Escher *et al.*, 2000)	3.35	(Escher *et al.*, 2000)
Genistein	Roth	446-72-0	3.08	PP-LFER	7.2	(Zielonka *et al.*, 2003)	3.65	PP-LFER	3.30	COSMO*mic*
Triclosan	Fluka	3380-34-5	4.76	PhysProp exp. Chem Inspect Test Inst (1992)	7.9	(Lindström *et al.*, 2002)	5.43	PP-LFER	3.41	COSMO*mic*
Paracetamol	Sigma-Aldrich	103-90-2	0.46	PhysProp exp. Sangster (1994)	9.38	PhysProp, exp. Dastmalchi *et al.* (1995)	1.02	COSMO*mic*	1.35	COSMO*mic*
Cationic and neutral/cationic chemicals										
Cimetidine	Sigma-Aldrich	51481-61-9	0.40	PhysProp exp. Hansch (1995)	6.8	PhysProp exp. Tomlsison and Hafkenscheid (1986)	0.46	COSMO*mic*	0.22	COSMO*mic*
Citalopram	Fluorochem LTD	59729-33-8	3.58	PP-LFER	9.59	(Vasskog *et al.*, 2006)	3.30	PP-LFER	1.31	COSMO*mic*
Verapamil	Sigma-Aldrich	52-53-9	3.79	PhysProp exp. Hansch (1995)	8.92	(Hasegawa *et al.*, 1984)	3.82	PP-LFER	1.27	COSMO*mic*
Propranolol	Sigma-Aldrich	525-66-6	3.48	PhysProp, exp. Avdeef (1997)	9.53	(Avdeef *et al.*, 1998)	3.40	(Barzanti *et al.*, 2007)	2.6	(Barzanti *et al.*, 2007)
Lamotrigine	Cayman Chemical Company	84057-84-1	2.57	PhysProp exp. BioByte (2009)	5.34	(Ishihama *et al.*, 2002)	2.74	PP-LFER	1.74	COSMO*mic*
Doxylamine	Sigma-Aldrich	469-21-6	2.47	PPLFER	8.7	ACD/pKa GALAS	4.46	COSMO*mic*	1.24	COSMO*mic*
Diphenhydramine	Sigma-Aldrich	58-73-1	3.27	PhysProp, exp. Hansch (1995)	8.98	PhysProp, exp. Sangster (1994)	4.80	PP-LFER	2.16	COSMO*mic*
Climbazole	Fluka Analytical Standard	38083-17-9	2.96	PP-LFER	6.6	ACD/pKa GALAS	2.96	PP-LFER	3.03	COSMO*mic*
Loratadine	Sigma-Aldrich	79794-75-5	5.2	PhysProp, exp. Hansch (1995)	4.75	ACD/pKa GALAS	4.31	COSMO*mic*	1.76	COSMO*mic*
Cinnarizine	Sigma-Aldrich	298-57-7	5.77	PhysProp, exp. BioByte (1995)	8.04	ACD/pKa GALAS	5.73	pp-LFER	3.55	COSMO*mic*
Spiroxamine	Fluka Pestanal	118134-30-8	6.05	PP-LFER	6.9	(PPDB, 2007)	5.05	PP-LFER	2.86	COSMO*mic*
Hexadecyltrimethylammonium	Sigma-Aldrich	112-02-7	-	-	-	-	-	-	6.38	COSMO*mic*

Chemical name	Provider	CAS #	log K_{ow} [L/L] 25°C	Reference[a,b]	pK_a	Reference[c]	log$K_{lipw\ neutral}$ (25°C)	Reference	log$K_{lipw\ ion}$	Reference
Hexadecylpyridinium	Sigma-Aldrich	7773-52-6	-	-	-	-	-	-	6.73	COSMO*mic*
Didecyldimethylammonium	Sigma-Aldrich	7173-51-5	-	-	-	-	-	-	6.85	COSMO*mic*

[a]PhysProp database accessed via Episuite (U.S. EPA, 2009). The references are found in the PhysProp database and are added here only for orientation. [b]Calculated with the PP-LFER equation for logK_{lipw} = 0.48 + 0.55L – 0.95 S – 0.05 A -4.02 B + 1.65 V (Endo *et al.*, 2011) and chemical parameters taken from the UFZ-LSER database v 3.1.(Endo *et al.*, 2015) [c]ACD/Percepta (ACD/Percepta, 2015).

S3. Additional information on the single chemical experiments

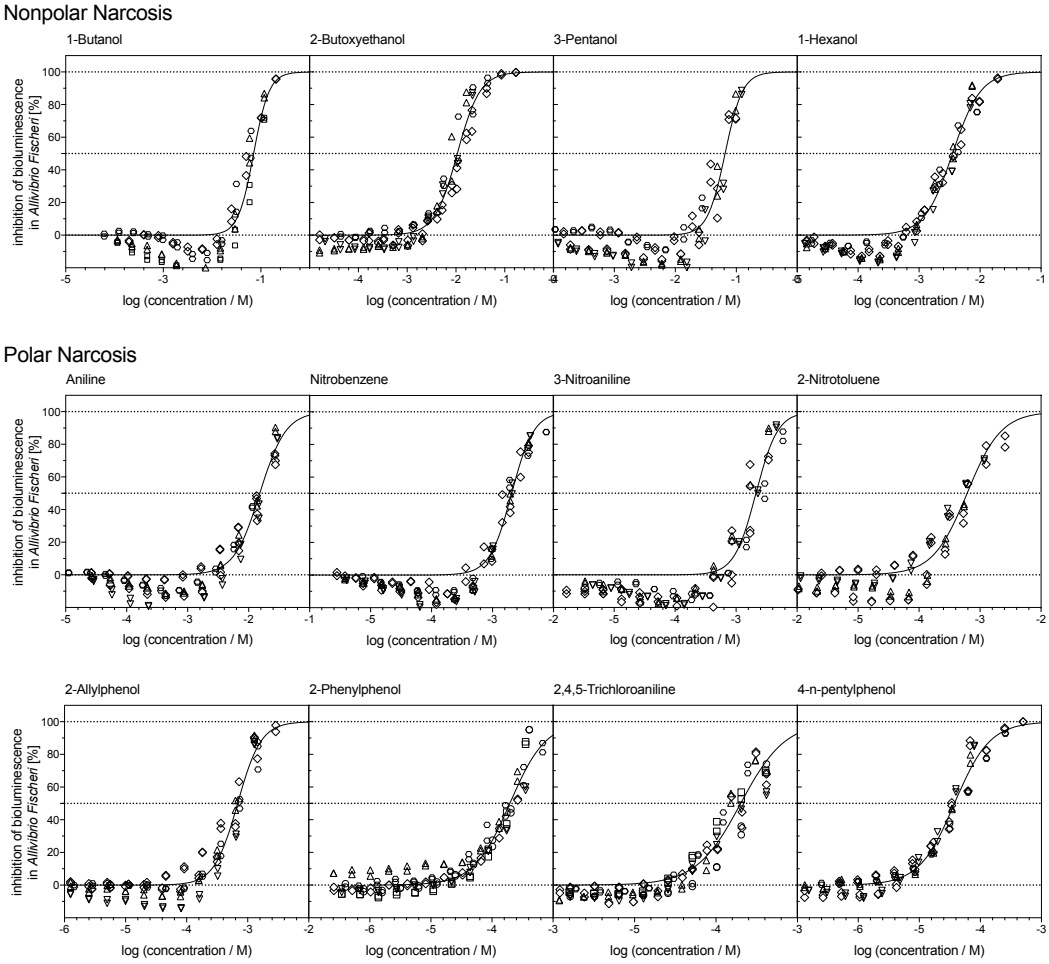

Fig. S2 Concentration-effect curves of the 12 baseline toxicants of the training set.

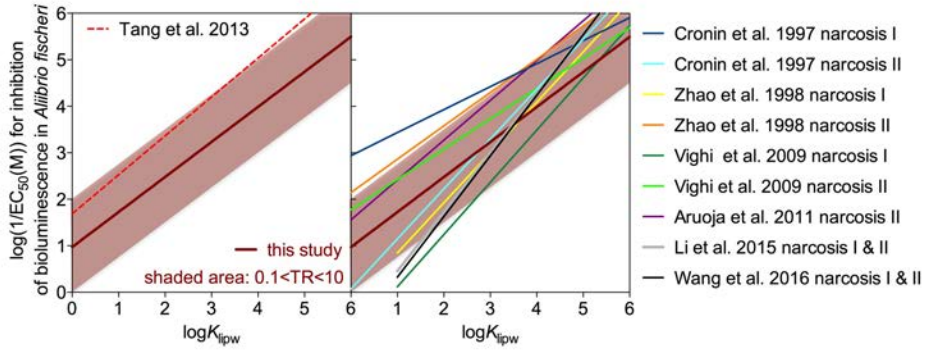

Fig. S3. Comparison of the baseline toxicity QSAR developed in this study for the 384-well plate format (in dark red red) with previous studies on narcosis I (nonpolar narcosis) (polar narcosis) chemicals, including our own previous study of the Microtox test performed in 96-well plate format(Tang *et al.*, 2013) (light red) and QSARs published in literature (Cronin and Schultz, 1997; Zhao *et al.*, 1998; Vighi *et al.*, 2009; Aruoja *et al.*, 2011; Li *et al.*, 2015; Wang *et al.*, 2016). This figure is amended from a figure in (Tang *et al.*, 2013) and the logK_{ow} values are rescaled to logK_{lipw} values using the with the logK_{lipw}-logK_{ow} relationships provided by (Vaes *et al.*, 1997) The shaded area comprises the range of 0.1 < TR < 10 of the baseline toxicity QSAR of the present study.

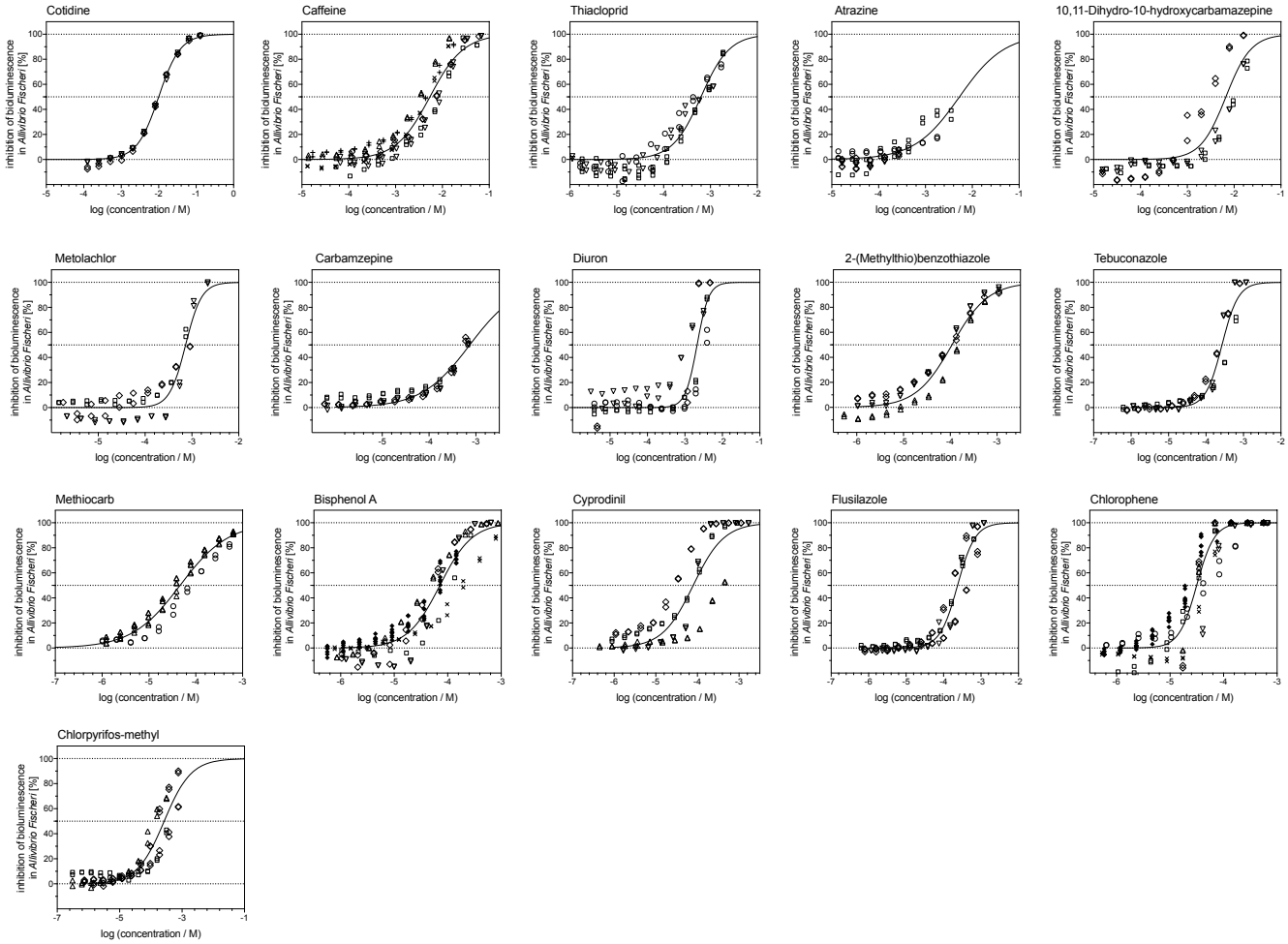

Fig. S4 Concentration-effect curves of the neutral chemicals of the set.

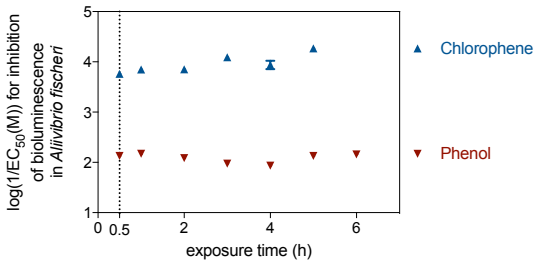

Fig. S5 Dependence of EC_{50} values of phenol and chlorophene on the exposure time.

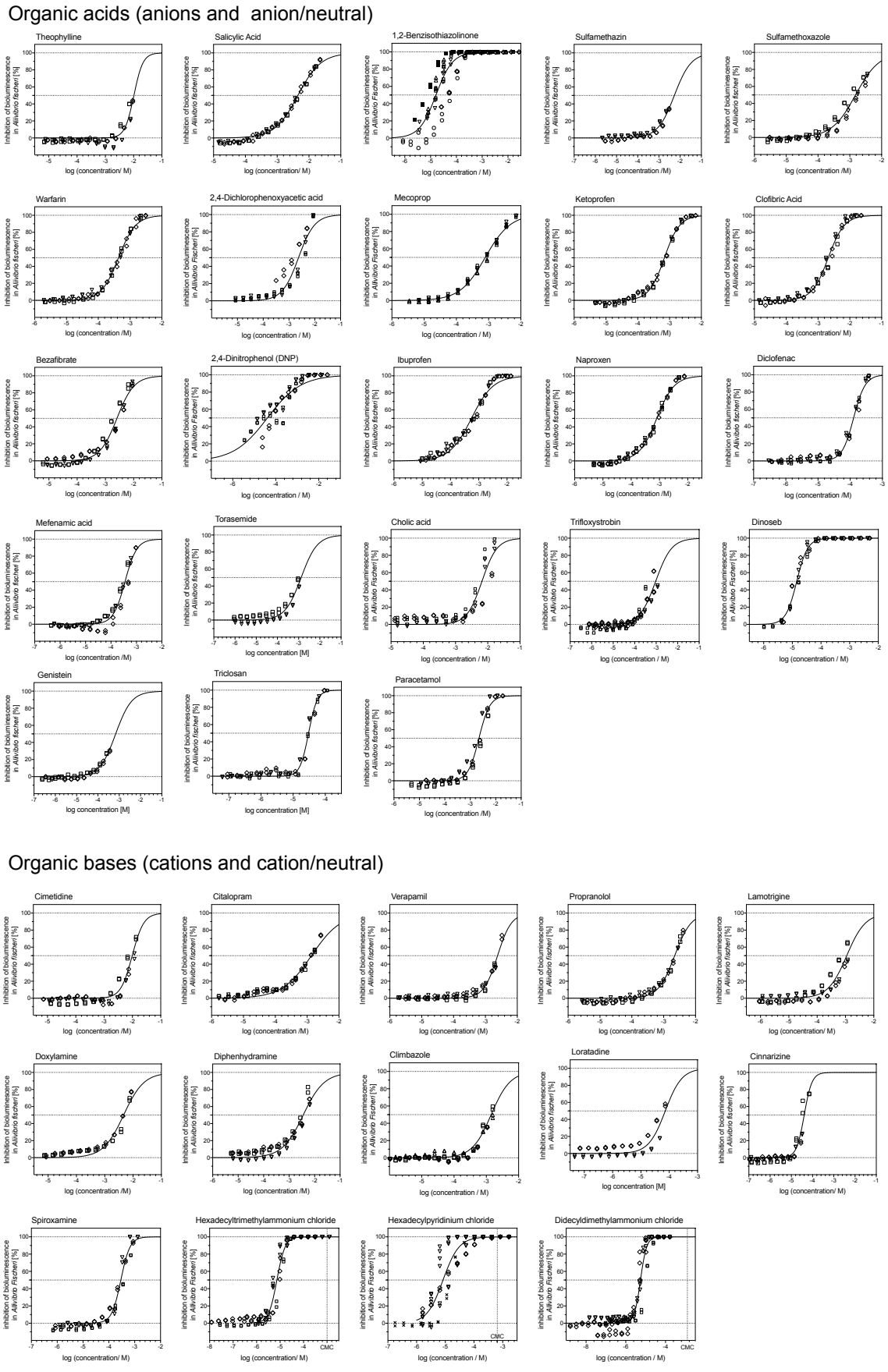

Fig. S6 Concentration-effect curves of the ionic/ionisable chemicals.

S3. Additional information on the mixture experiments

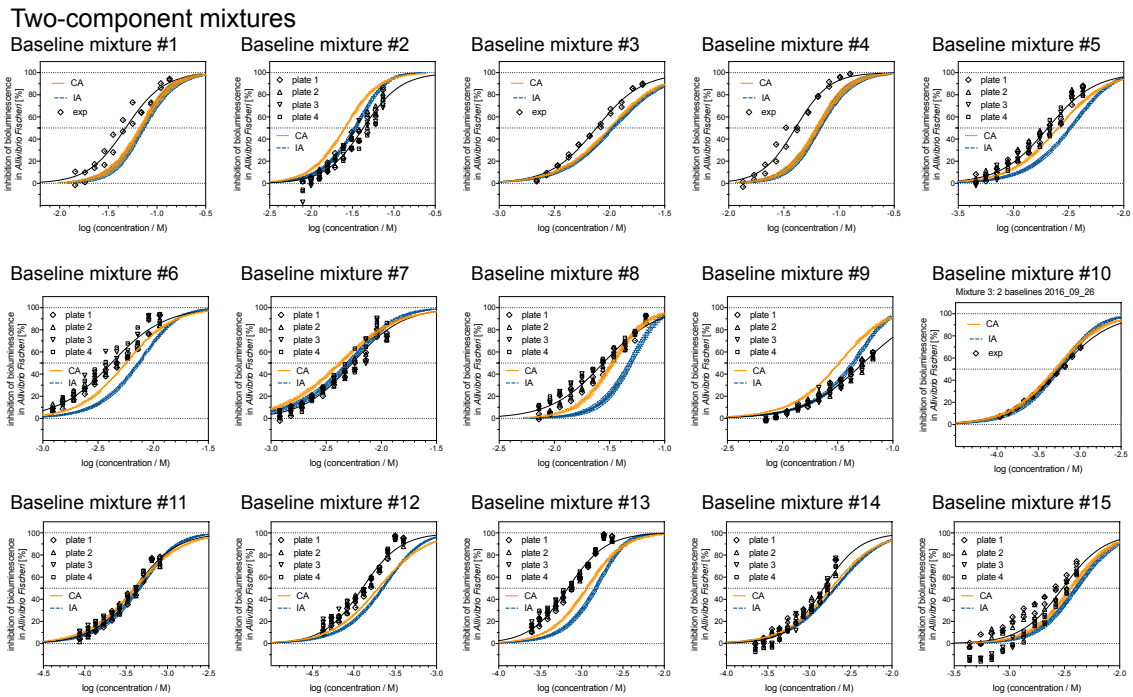

Fig. S7 Concentration-effect curves of the 2-component mixtures of baseline toxicants.

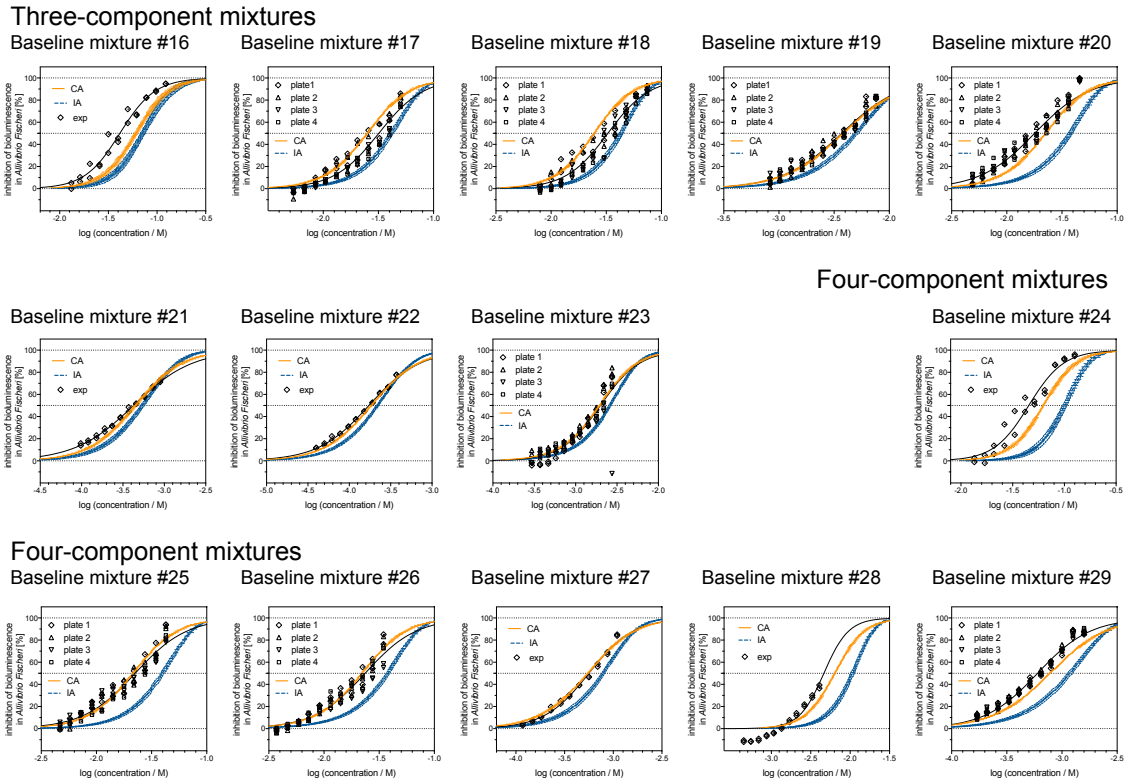

Fig. S8 Concentration-effect curves of the 3- and 4-component mixtures of baseline toxicants.

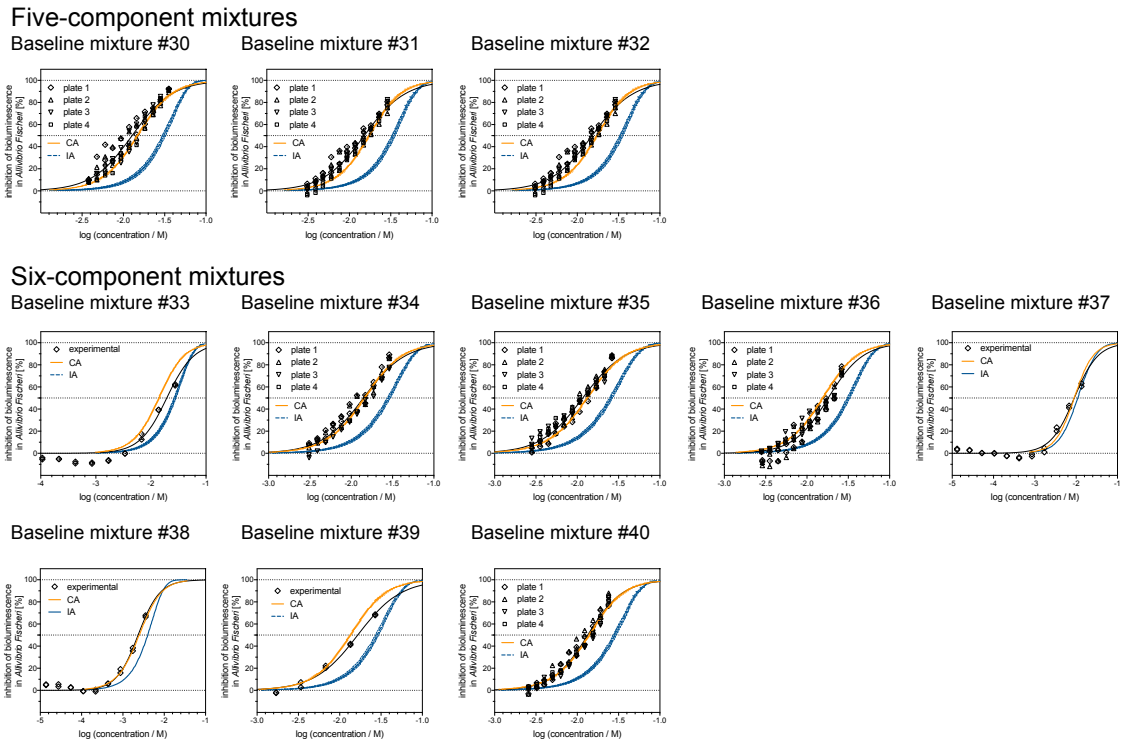

Fig. S9 Concentration-effect curves of the 5-and 6-component mixtures of baseline toxicants.

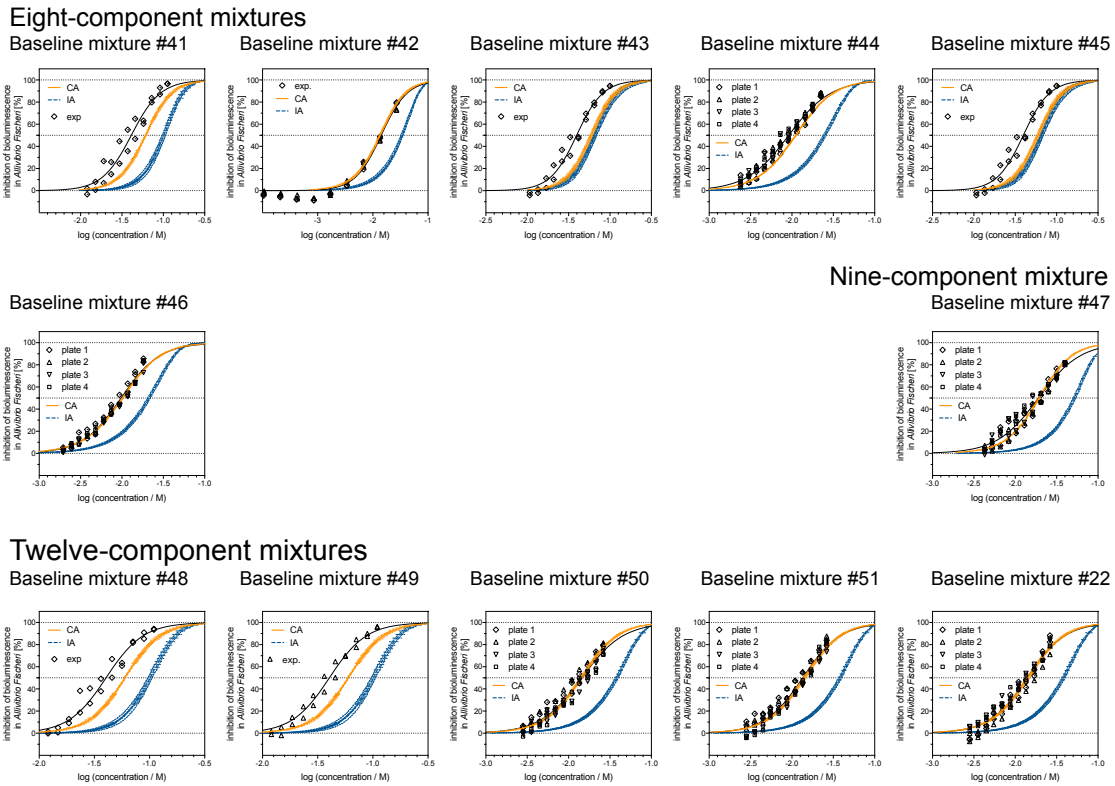

Fig. S10 Concentration-effect curves of the 8-, 9- and 12-component mixtures of baseline toxicants.

Table S4 Summary of the composition of the components (in % mol fractions) in the mixture experiments, experimental EC_{50} and slope from fit of experimental data.

Base-line mix-ture	1-Buta-nol	2-Butoxy ethanol	3-Penta-nol	1-Hexa-nol	Aniline	Nitro-ben-zene	3-Nitro-aniline	2-Nitro-toluene	2-Allyl-phenol	2-Phenyl phenol	2,4,5-Trichlor o-aniline	4-n-Pentyl-phenol	$logEC_{50,exp}$		Slope	
		Nonpolar Narcotics						Polar Narcotics								
#1	99.8%			0.25%									-1.32	±0.02	2.24	±0.18
#2	95.3%			4.73%									-1.37	±0.01	1.91	±0.09
#3		99.6%							0.41%				-2.12	±0.01	2.10	±0.07
#4			99.9%				0.11%						-1.39	±0.01	2.85	±0.19
#5				83.8%					16.2%				-2.69	±0.01	2.04	±0.06
#6		94.0%							6.01%				-2.38	±0.01	1.80	±0.07
#7		94.6%						5.43%					-2.26	±0.01	1.92	±0.07
#8			96.9%				3.14%						-1.56	±0.01	1.82	±0.06
#9			99.9%									0.06%	-1.27	±0.01	1.63	±0.05
#10								90.7%		9.28%			-3.24	±0.00	1.41	±0.02
#11								75.8%		24.2%			-3.40	±0.01	1.69	±0.04
#12										49.4%	50.6%		-3.90	±0.01	1.88	±0.06
#13							91.3%				8.66%		-3.17	±0.01	1.89	±0.06
#14					98.2%							1.80%	-2.83	±0.01	1.97	±0.08
#15					50.0%	50.0%							-2.52	±0.01	2.31	±0.18
#16	97.6%	2.19%		0.24%									-1.38	±0.01	2.41	±0.16
#17	94.4%			4.69%					0.91%				-1.50	±0.01	2.14	±0.11
#18	96.3%					2.78%			0.92%				-1.49	±0.01	2.30	±0.10
#19		93.0%						5.34%		1.71%			-2.43	±0.01	1.62	±0.05
#20			96.6%				3.13%				0.30%		-1.75	±0.02	1.77	±0.12
#21								82.6%		8.46%	8.90%		-3.37	±0.00	1.23	±0.02
#22										47.9%	50.4%	1.77%	-3.76	±0.00	1.41	±0.03
#23					49.5%	49.5%						0.91%	-2.70	±0.02	1.84	±0.14
#24	53.5%	1.20%	45.1%	0.13%									-1.34	±0.02	2.59	±0.24
#25	82.7%	12.4%		4.11%					0.79%				-1.65	±0.01	1.85	±0.08
#26			94.0%		2.95%	2.95%						0.05%	-1.63	±0.01	1.88	±0.08
#27								40.8%	50.7%	4.17%	4.39%		-3.25	±0.01	1.90	±0.07
#28					78.2%	10.5%	11.2%					0.004%	-2.33	±0.04	2.77	±0.57
#29							67.7%	19.6%		6.26%	6.42%		-3.22	±0.01	1.81	±0.04
#30	80.2%	12.0%		3.98%			2.39%	0.69%	0.77%				-1.90	±0.01	1.78	±0.07
#31			91.3%		2.87%	2.87%	2.96%					0.053%	-1.82	±0.01	1.74	±0.06
#32			95.4%				3.10%	0.89%		0.29%	0.29%		-1.90	±0.01	1.81	±0.06
#33	80.9%	13.2%		4.19%				0.72%	0.79%	0.25%			-1.71	±0.03	1.77	±0.23
#34	81.9%	12.3%		4.07%				0.71%	0.79%	0.23%			-1.85	±0.01	1.72	±0.07
#35		13.5%	82.6%				2.68%	0.77%		0.25%	0.25%		-1.93	±0.01	1.72	±0.05
#36	89.5%			4.44%	2.58%	2.58%			0.86%			0.047%	-1.74	±0.01	2.07	±0.10
#37		95.8%					4.07%	0.10%		0.02%	0.03%	0.002%	-2.05	±0.02	1.52	±0.12
#38		78.3%					16.1%	2.53%		1.25%	1.47%	0.323%	-2.63	±0.02	1.66	±0.13
#39			76.0%		18.3%	2.56%	2.80%				0.25%	0.049%	-1.78	±0.01	1.67	±0.10
#40			91.0%		2.86%	2.86%	2.95%				0.28%	0.052%	-1.87	±0.01	2.06	±0.07
#41	53.3%	1.20%	45.0%	0.13%	0.33%	0.04%			$5 \cdot 10^{-4}$			$1 \cdot 10^{-5}$	-1.39	±0.02	2.46	±0.23
#42	97.5%	2.19%		0.24%			0.09%	$7 \cdot 10^{-3}$	$9 \cdot 10^{-3}$	10^{-3}%	10^{-3}%		-1.43	±0.02	2.27	±0.20
#43	79.8%	12.0%		3.96%			2.38%	0.69%	0.77%	0.22%	0.23%		-2.04	±0.01	1.71	±0.05
#44			99.1%		0.73%	0.10%	0.10%	0.01%		$8 \cdot 10^{-4}$	$9 \cdot 10^{-4}$	$3 \cdot 10^{-5}$	-1.40	±0.01	2.73	±0.20
#45			90.0%		2.83%	2.83%	2.92%	0.84%		0.27%	0.28%	0.052%	-2.01	±0.01	1.86	±0.06
#46	45.1%	6.77%	41.5%	2.24%	1.30%	1.30%	1.34%		0.43%			0.024%	-1.72	±0.01	1.73	±0.06
#47	40.7%	6.64%	37.8%	2.11%	9.10%	1.27%	1.39%	0.36%	0.40%	0.12%	0.13%	0.024%	-1.85	±0.02	1.84	±0.12
#48	53.3%	1.20%	45.0%	0.13%	0.33%	0.04%	0.05%	0.004	0.005	$4 \cdot 10^{-4}$	$4 \cdot 10^{-4}$	10^{-5}%	-1.40	±0.02	2.43	±0.19
#49	53.3%	1.20%	45.0%	0.13%	0.33%	0.04%	0.05%	0.004	0.005	$4 \cdot 10^{-4}$	$4 \cdot 10^{-4}$	10^{-5}%	-1.39	±0.01	2.74	±0.16
#50	44. %	6.73%	41.2%	2.23%	1.29%	1.29%	1.34%	0.39%	0.43%	0.12%	0.13%	0.024%	-1.84	±0.01	1.74	±0.06
#51	44.9%	6.73%	41.2%	2.23%	1.29%	1.29%	1.34%	0.39%	0.43%	0.12%	0.13%	0.024%	-1.87	±0.01	1.89	±0.06
#52	44.9%	6.73%	41.2%	2.23%	1.29%	1.29%	1.34%	0.39%	0.43%	0.12%	0.13%	0.024%	-1.86	±0.01	1.91	±0.07

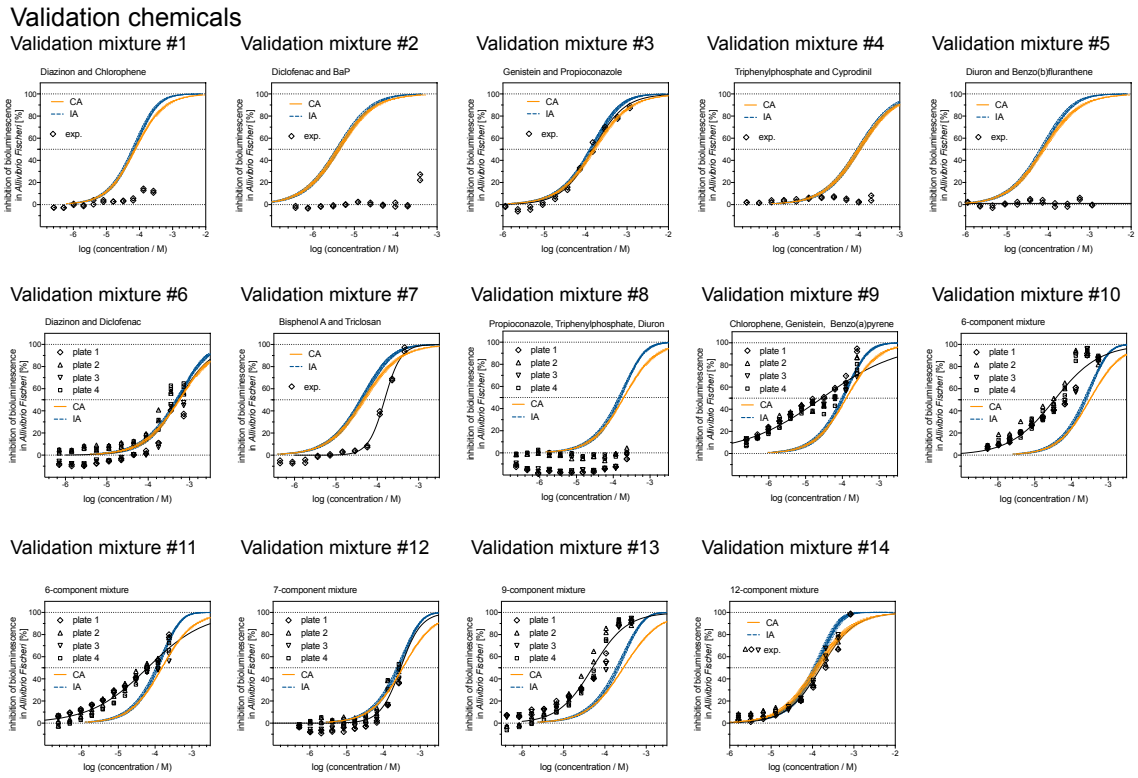

Fig. S11 Concentration-effect curves of the mixtures of chemicals from the validation chemical set.

Table S5 Summary of the composition of the components (in % mol fractions) in the mixture experiments with the chemicals from the set, experimental $EC_{50,exp}$ and slope from fit of experimental data.

mixture	Diclofenac	Bisphenol A	Diuron	Chlorophene	Triclosan	Genistein	Cyprodinil	Diazinon	Propiconazole	Triphenylphosphate	Benzo(a)pyrene	Benzo(b)fluoranthene	$LogEC_{50,exp}$		Slope	
	active	active	active	active	active	active	active	not active	not active	not active	not active	not active				
#1				35.0%				65.0%					no effect			
#2	68.9%										31.1%		no effect			
#3						83.1%			16.9%				-3.82	±0.02	1.14	±0.06
#4							77.8%			22.2%			no effect			
#5			99.6%									0.4%	no effect			
#6	39.8%							60.2%					-3.27	±0.04	1.06	±0.10
#7		84.2%			15.8%								-3.82	±0.02	2.21	±0.17
#8			68.8%						24.4%	6.8%			no effect			
#9				10.1%		88.2%					1.7%		-4.56	±0.04	0.41	±0.02
#10	29.3%	7.3%		1.9%	0.33%	16.8%		44.3%					-4.46	±0.03	0.71	±0.03
#11			33.3%	5.2%		45.6%			11.8%	3.3%	0.9%		-4.21	±0.02	0.56	±0.02
#12	29.5%	7.4%	12.4%					44.7%	4.4%	1.2%	0.3%		-3.53	±0.02	1.57	±0.14
#13	24.8%	6.2%	10.4%	1.6%		14.3%		37.6%	3.7%	1.0%	0.3%		-4.30	±0.02	1.05	±0.05
#14	5.4%	7.8%	22.9%	4.8%	0.7%	47.4%	2.5%	3.4%	4.0%	0.9%	0.1%	0.1%	-3.80	±0.02	1.06	±0.05

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