Cytotoxicity of ionic liquids and precursor compounds towards human cell line HeLa

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1a. Toxicity of some common solvents and salts towards HeLa cells.

Table 1. Toxicity of some common solvents and salts towards HeLa cells, determined after 48 hours in the presence of FBS.

Compound	f(x10^{-4})	b	EC_{50} ± SE[a] (mM)	R^2
Acetone	-[b]	1.14	449 ± 69	0.97
Acetonitrile	-	-	>2900	-
Ethanol	-	2.92	866 ± 37	0.99
N,N-Dimethylformamide	-	3.92	103 ± 8	0.99
Dimethylsulfoxide	-	3.50	449 ± 56	0.98
Sodium dodecylbenzenesulfonate	-	14.79	0.18 ± 0.01	0.99
Sodium chloride	54.2	2.01	101 ± 32	0.95
Sodium bromide	0.3	5.04	70 ± 6	0.97
Lithium chloride	10	2.14	41.02 ± 2.49	0.99
Lithium bromide	-	1.59	28.82 ± 5.19	0.95

[a]Standard error.

[b]f was fixed as zero.

1b. Detailed parameters for salts used in concentration addition experiments.

Table 2. Detailed parameters for salts used in concentration addition experiments. Toxicities determined in the absence of FBS after 24 hours.

Cation	-R	Anion	f ± SE_f (x10^{-4})	b ± SE_b	EC_{50} ± SE_{EC50} (mM)	s[a]	R^2
1	$-C_2H_5$	Br^-	-	2.89 ± 0.22	9.60 ± 0.35	4	0.99
1	$-C_4H_9$	Br^-	-	0.93 ± 0.09	2.16 ± 0.23	6	0.98
1	$-C_8H_{17}$	Br^-	-	1.09 ± 0.06	0.02 ± 0.001	5	0.99
1	$-CH_2C_6H_5$	Br^-	-	0.87 ± 0.05	0.55 ± 0.03	6	0.99
2	$-C_2H_5$	Br^-	-	1.24 ± 0.16	13.85 ± 1.34	6	0.98
2	$-C_4H_9$	Br^-	-	0.83 ± 0.12	1.74 ± 0.28	6	0.97
2	$-C_8H_{17}$	Br^-	-	1.29 ± 0.10	0.04 ± 0.003	4	0.99
2	$-CH_2C_6H_5$	Br^-	-	1.03 ± 0.10	0.53 ± 0.05	4	0.99
3	$-CH_3$	Br^-	0.74 ± 0.14	4.09 ± 0.53	69.57 ± 2.94	6	0.99
3	$-C_2H_5$	Br^-	0.23 ± 0.14	4.69 ± 0.61	53.23 ± 1.70	6	0.99
3	$-C_4H_9$	Br^-	0.71 ± 0.60	2.52 ± 0.44	25.23 ± 2.23	4	0.98
3	$-C_8H_{17}$	Br^-	-	1.42 ± 0.08	0.20 ± 0.01	6	0.99
3	$-CH_2C_6H_5$	Br^-	-	1.21 ± 0.14	2.87 ± 0.31	4	0.98
Li^+	-	Br^-	0.97 ± 0.29	3.24 ± 0.21	32.73 ± 0.91	6	0.99

[a] Sample size. See section 5.

2. Results from concentration addition experiments

Table 3. Concentration addition data for mixtures of salts and cells cultured in the absence of FBS for 24 hours.

Entry	Mixture	C_1[a]/$EC_{50,1}$[b]	$C_2/EC_{50,2}$	P[c] ± SE	P^{-}[d]	P^{+}[e]
1	[C_2Chol]Br (1) and [C_4Chol]Br (2)	1.0	-	0.50 ± 0.04	0.47	0.53
		0.9	0.1	0.50 ± 0.03	0.47	0.53
		0.8	0.2	0.51 ± 0.05	0.46	0.54
		0.7	0.3	0.47 ± 0.02	0.45	0.54
		0.6	0.4	0.46 ± 0.04	0.45	0.55
		0.5	0.5	0.45 ± 0.03	0.44	0.55
		0.4	0.6	0.49 ± 0.02	0.43	0.56
		0.3	0.7	0.50 ± 0.01	0.43	0.57
		0.2	0.8	0.46 ± 0.01	0.42	0.57
		0.1	0.9	0.50 ± 0.02	0.41	0.58
		-	1.0	0.50 ± 0.02	0.41	0.58
2	[C_2Chol]Br (1) and [C_8Chol]Br (2)	1.0	-	0.54 ± 0.03	0.48	0.52
		0.9	0.1	0.58 ± 0.06	0.48	0.52
		0.8	0.2	0.56 ± 0.06	0.48	0.53
		0.7	0.3	0.60 ± 0.04	0.47	0.53
		0.6	0.4	0.56 ± 0.04	0.47	0.53
		0.5	0.5	0.54 ± 0.05	0.47	0.53
		0.4	0.6	0.48 ± 0.02	0.47	0.54
		0.3	0.7	0.43 ± 0.03	0.47	0.54
		0.2	0.8	0.42 ± 0.03	0.46	0.54
		0.1	0.9	0.45 ± 0.02	0.46	0.54
		-	1.0	0.48 ± 0.02	0.46	0.54
3	[C_2Chol]Br (1) and [$C_6H_5CH_2$Chol]Br (2)	1.0	-	0.51 ± 0.03	0.48	0.52
		0.9	0.1	0.57 ± 0.02	0.47	0.53
		0.8	0.2	0.58 ± 0.04	0.46	0.53
		0.7	0.3	0.58 ± 0.04	0.46	0.54
		0.6	0.4	0.60 ± 0.04	0.45	0.54
		0.5	0.5	0.55 ± 0.03	0.44	0.55
		0.4	0.6	0.56 ± 0.03	0.44	0.56
		0.3	0.7	0.54 ± 0.02	0.43	0.56
		0.2	0.8	0.54 ± 0.03	0.42	0.57
		0.1	0.9	0.50 ± 0.03	0.42	0.57
		-	1.0	0.49 ± 0.03	0.41	0.58
4	[C_4Chol]Br (1) and[C_8Chol]Br (2)	1.0	-	0.46 ± 0.03	0.45	0.55
		0.9	0.1	0.53 ± 0.03	0.45	0.54
		0.8	0.2	0.60 ± 0.04	0.45	0.54
		0.7	0.3	0.68 ± 0.04	0.46	0.54
		0.6	0.4	0.67 ± 0.03	0.46	0.54
		0.5	0.5	0.64 ± 0.07	0.46	0.54
		0.4	0.6	0.57 ± 0.03	0.46	0.54
		0.3	0.7	0.58 ± 0.04	0.47	0.53
		0.2	0.8	0.57 ± 0.05	0.47	0.53
		0.1	0.9	0.56 ± 0.03	0.47	0.53
		-	1.0	0.51 ± 0.01	0.47	0.53
5	[C_4Chol]Br (1) and [$C_6H_5CH_2$Chol]Br (2)	1.0	-	0.51 ± 0.01	0.45	0.54
		0.9	0.1	0.56 ± 0.03	0.45	0.55
		0.8	0.2	0.55 ± 0.05	0.45	0.55

Entry	Mixture	C_1[a]/$EC_{50,1}$[b]	$C_2/EC_{50,2}$	P[c] ± SE	P[-,d]	P[+,e]
		0.7	0.3	0.57 ± 0.04	0.45	0.55
		0.6	0.4	0.56 ± 0.02	0.45	0.55
		0.5	0.5	0.58 ± 0.04	0.45	0.55
		0.4	0.6	0.56 ± 0.02	0.45	0.55
		0.3	0.7	0.58 ± 0.03	0.44	0.55
		0.2	0.8	0.54 ± 0.01	0.44	0.55
		0.1	0.9	0.57 ± 0.02	0.44	0.55
		-	1.0	0.52 ± 0.03	0.44	0.55
6	[C_8Chol]Br (1) and [$C_6H_5CH_2$Chol]Br (2)	1.0	-	0.52 ± 0.05	0.48	0.52
		0.9	0.1	0.51 ± 0.01	0.48	0.52
		0.8	0.2	0.46 ± 0.02	0.48	0.52
		0.7	0.3	0.47 ± 0.02	0.48	0.52
		0.6	0.4	0.48 ± 0.02	0.47	0.53
		0.5	0.5	0.47 ± 0.01	0.47	0.53
		0.4	0.6	0.48 ± 0.03	0.47	0.53
		0.3	0.7	0.47 ± 0.03	0.47	0.53
		0.2	0.8	0.47 ± 0.01	0.47	0.53
		0.1	0.9	0.47 ± 0.02	0.46	0.53
		-	1.0	0.49 ± 0.01	0.46	0.54
7	[C_2Py]Br (1) and [C_4Py]Br (2)	1.0	-	0.50 ± 0.03	0.48	0.52
		0.9	0.1	0.51 ± 0.02	0.48	0.52
		0.8	0.2	0.51 ± 0.05	0.47	0.52
		0.7	0.3	0.54 ± 0.02	0.47	0.53
		0.6	0.4	0.56 ± 0.03	0.47	0.53
		0.5	0.5	0.53 ± 0.03	0.47	0.53
		0.4	0.6	0.50 ± 0.05	0.47	0.53
		0.3	0.7	0.55 ± 0.04	0.47	0.53
		0.2	0.8	0.55 ± 0.08	0.46	0.53
		0.1	0.9	0.47 ± 0.05	0.46	0.53
		-	1.0	0.50 ± 0.05	0.46	0.53
8	[C_2Py]Br (1) and [C_8Py]Br (2)	1.0	-	0.50 ± 0.04	0.47	0.53
		0.9	0.1	0.61 ± 0.02	0.47	0.53
		0.8	0.2	0.66 ± 0.14	0.47	0.53
		0.7	0.3	0.64 ± 0.04	0.47	0.53
		0.6	0.4	0.64 ± 0.07	0.47	0.52
		0.5	0.5	0.63 ± 0.03	0.47	0.52
		0.4	0.6	0.51 ± 0.02	0.47	0.52
		0.3	0.7	0.56 ± 0.03	0.47	0.52
		0.2	0.8	0.58 ± 0.08	0.47	0.52
		0.1	0.9	0.65 ± 0.10	0.47	0.52
		-	1.0	0.50 ± 0.04	0.47	0.52
9	[C_2Py]Br (1) and [$C_6H_5CH_2$Py]Br (2)	1.0	-	0.50 ± 0.05	0.47	0.52
		0.9	0.1	0.54 ± 0.06	0.47	0.52
		0.8	0.2	0.56 ± 0.04	0.47	0.52
		0.7	0.3	0.57 ± 0.01	0.47	0.52
		0.6	0.4	0.56 ± 0.02	0.47	0.53
		0.5	0.5	0.59 ± 0.04	0.47	0.53
		0.4	0.6	0.63 ± 0.02	0.47	0.53
		0.3	0.7	0.62 ± 0.04	0.47	0.53
		0.2	0.8	0.60 ± 0.02	0.47	0.53
		0.1	0.9	0.52 ± 0.04	0.47	0.53
		-	1.0	0.50 ± 0.01	0.47	0.53
10	[C_4Py]Br (1) and	1.0	-	0.50 ± 0.05	0.46	0.53

Entry	Mixture	$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	P ± SE	$P^{-,d}$	$P^{+,e}$
	$[C_8Py]Br$ (2)	0.9	0.1	0.56 ± 0.06	0.46	0.54
		0.8	0.2	0.60 ± 0.05	0.46	0.53
		0.7	0.3	0.53 ± 0.06	0.46	0.53
		0.6	0.4	0.55 ± 0.03	0.46	0.53
		0.5	0.5	0.59 ± 0.07	0.47	0.53
		0.4	0.6	0.55 ± 0.04	0.47	0.53
		0.3	0.7	0.60 ± 0.05	0.47	0.53
		0.2	0.8	0.61 ± 0.05	0.47	0.52
		0.1	0.9	0.50 ± 0.04	0.48	0.52
		-	1.0	0.50 ± 0.05	0.48	0.52
11	$[C_4Py]Br$ (1) and $[C_6H_5CH_2Py]Br$ (2)	1.0	-	0.50 ± 0.03	0.47	0.53
		0.9	0.1	0.58 ± 0.05	0.47	0.53
		0.8	0.2	0.57 ± 0.07	0.47	0.53
		0.7	0.3	0.52 ± 0.06	0.47	0.53
		0.6	0.4	0.51 ± 0.05	0.47	0.53
		0.5	0.5	0.48 ± 0.06	0.47	0.53
		0.4	0.6	0.48 ± 0.06	0.47	0.53
		0.3	0.7	0.55 ± 0.05	0.47	0.53
		0.2	0.8	0.54 ± 0.06	0.47	0.52
		0.1	0.9	0.51 ± 0.04	0.47	0.52
		-	1.0	0.50 ± 0.03	0.47	0.52
12	$[C_8Py]Br$ (1) and $[C_6H_5CH_2Py]Br$ (2)	1.0	-	0.50 ± 0.02	0.48	0.52
		0.9	0.1	0.50 ± 0.01	0.48	0.52
		0.8	0.2	0.50 ± 0.04	0.48	0.52
		0.7	0.3	0.49 ± 0.03	0.47	0.52
		0.6	0.4	0.52 ± 0.02	0.47	0.52
		0.5	0.5	0.49 ± 0.01	0.47	0.52
		0.4	0.6	0.47 ± 0.01	0.47	0.53
		0.3	0.7	0.47 ± 0.03	0.47	0.53
		0.2	0.8	0.49 ± 0.05	0.47	0.53
		0.1	0.9	0.51 ± 0.06	0.47	0.53
		-	1.0	0.50 ± 0.02	0.47	0.53
13	$[C_2mim]Br$ (1) and $[C_4mimBr]$ (2)	1.0	-	0.50 ± 0.04	0.48	0.52
		0.9	0.1	0.53 ± 0.05	0.48	0.52
		0.8	0.2	0.56 ± 0.06	0.47	0.52
		0.7	0.3	0.51 ± 0.04	0.47	0.52
		0.6	0.4	0.55 ± 0.03	0.47	0.53
		0.5	0.5	0.56 ± 0.04	0.47	0.53
		0.4	0.6	0.53 ± 0.06	0.47	0.53
		0.3	0.7	0.48 ± 0.02	0.46	0.53
		0.2	0.8	0.47 ± 0.03	0.46	0.54
		0.1	0.9	0.45 ± 0.01	0.46	0.54
		-	1.0	0.51 ± 0.01	0.46	0.54
14	$[C_2mim]Br$ (1) and $[C_8mim]Br$ (2)	1.0	-	0.54 ± 0.05	0.48	0.52
		0.9	0.1	0.61 ± 0.04	0.48	0.52
		0.8	0.2	0.63 ± 0.02	0.48	0.52
		0.7	0.3	0.64 ± 0.02	0.48	0.52
		0.6	0.4	0.60 ± 0.03	0.48	0.52
		0.5	0.5	0.64 ± 0.03	0.48	0.52
		0.4	0.6	0.64 ± 0.05	0.48	0.52
		0.3	0.7	0.68 ± 0.03	0.47	0.52
		0.2	0.8	0.68 ± 0.04	0.47	0.53
		0.1	0.9	0.68 ± 0.05	0.47	0.53

Entry	Mixture	$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	P ± SE	$P^{-,d}$	$P^{+,e}$
		-	1.0	0.55 ± 0.02	0.47	0.53
15	[C_2mim]Br (1) and [$C_6H_5CH_2$mim]Br (2)	1.0	-	0.51 ± 0.01	0.48	0.52
		0.9	0.1	0.46 ± 0.03	0.48	0.52
		0.8	0.2	0.53 ± 0.05	0.48	0.52
		0.7	0.3	0.51 ± 0.01	0.48	0.52
		0.6	0.4	0.53 ± 0.02	0.48	0.52
		0.5	0.5	0.64 ± 0.08	0.48	0.52
		0.4	0.6	0.66 ± 0.06	0.48	0.52
		0.3	0.7	0.68 ± 0.10	0.48	0.52
		0.2	0.8	0.55 ± 0.05	0.48	0.52
		0.1	0.9	0.54 ± 0.09	0.48	0.52
		-	1.0	0.50 ± 0.01	0.48	0.52
16	[C_4mim]Br (1) and [C_8mim]Br (2)	1.0	-	0.48 ± 0.05	0.48	0.52
		0.9	0.1	0.54 ± 0.02	0.48	0.52
		0.8	0.2	0.51 ± 0.03	0.48	0.52
		0.7	0.3	0.51 ± 0.01	0.48	0.52
		0.6	0.4	0.49 ± 0.07	0.48	0.52
		0.5	0.5	0.54 ± 0.03	0.48	0.52
		0.4	0.6	0.61 ± 0.01	0.48	0.52
		0.3	0.7	0.61 ± 0.04	0.48	0.52
		0.2	0.8	0.58 ± 0.03	0.48	0.52
		0.1	0.9	0.56 ± 0.02	0.48	0.51
		-	1.0	0.50 ± 0.01	0.49	0.51
17	[C_4mim]Br (1) and [$C_6H_5CH_2$mim]Br (2)	1.0	-	0.51 ± 0.01	0.48	0.52
		0.9	0.1	0.53 ± 0.04	0.48	0.52
		0.8	0.2	0.53 ± 0.01	0.48	0.52
		0.7	0.3	0.53 ± 0.01	0.48	0.52
		0.6	0.4	0.55 ± 0.02	0.48	0.51
		0.5	0.5	0.57 ± 0.02	0.49	0.51
		0.4	0.6	0.52 ± 0.02	0.49	0.51
		0.3	0.7	0.53 ± 0.01	0.49	0.51
		0.2	0.8	0.53 ± 0.02	0.49	0.51
		0.1	0.9	0.57 ± 0.02	0.49	0.51
		-	1.0	0.50 ± 0.02	0.49	0.51
18	[C_8mim]Br (1) and [$C_6H_5CH_2$mim]Br (2)	1.0	-	0.52 ± 0.01	0.49	0.51
		0.9	0.1	0.55 ± 0.03	0.49	0.51
		0.8	0.2	0.55 ± 0.05	0.49	0.51
		0.7	0.3	0.50 ± 0.04	0.49	0.51
		0.6	0.4	0.50 ± 0.04	0.49	0.51
		0.5	0.5	0.47 ± 0.04	0.49	0.51
		0.4	0.6	0.54 ± 0.03	0.49	0.51
		0.3	0.7	0.55 ± 0.02	0.49	0.51
		0.2	0.8	0.47 ± 0.01	0.49	0.51
		0.1	0.9	0.47 ± 0.04	0.49	0.51
		-	1.0	0.49 ± 0.02	0.49	0.51
19	[C_2Chol]Br (1) and [C_2Py]Br (2)	1.0	-	0.51 ± 0.01	0.48	0.52
		0.9	0.1	0.49 ± 0.01	0.47	0.52
		0.8	0.2	0.50 ± 0.02	0.47	0.53
		0.7	0.3	0.48 ± 0.01	0.47	0.53
		0.6	0.4	0.51 ± 0.02	0.46	0.54
		0.5	0.5	0.51 ± 0.04	0.46	0.54
		0.4	0.6	0.50 ± 0.01	0.45	0.54
		0.3	0.7	0.49 ± 0.02	0.45	0.55

Entry	Mixture	$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	P ± SE	$P^{-,d}$	$P^{+,e}$
		0.2	0.8	0.50 ± 0.03	0.44	0.55
		0.1	0.9	0.52 ± 0.02	0.44	0.56
		-	1.0	0.49 ± 0.02	0.43	0.56
20	[C_2Chol]Br (1) and [C_2mim]Br (2)	1.0	-	0.50 ± 0.02	0.47	0.53
		0.9	0.1	0.49 ± 0.01	0.47	0.53
		0.8	0.2	0.52 ± 0.04	0.47	0.53
		0.7	0.3	0.50 ± 0.03	0.47	0.53
		0.6	0.4	0.49 ± 0.01	0.47	0.53
		0.5	0.5	0.53 ± 0.01	0.47	0.53
		0.4	0.6	0.54 ± 0.02	0.47	0.53
		0.3	0.7	0.54 ± 0.03	0.47	0.53
		0.2	0.8	0.56 ± 0.04	0.46	0.53
		0.1	0.9	0.57 ± 0.02	0.46	0.54
		-	1.0	0.50 ± 0.03	0.46	0.54
21	[C_2Py]Br (1) and [C_2mim]Br (2)	1.0	-	0.50 ± 0.05	0.46	0.54
		0.9	0.1	0.51 ± 0.02	0.46	0.54
		0.8	0.2	0.50 ± 0.01	0.46	0.54
		0.7	0.3	0.49 ± 0.04	0.46	0.53
		0.6	0.4	0.48 ± 0.02	0.46	0.53
		0.5	0.5	0.50 ± 0.01	0.47	0.53
		0.4	0.6	0.53 ± 0.03	0.47	0.53
		0.3	0.7	0.52 ± 0.03	0.47	0.53
		0.2	0.8	0.53 ± 0.04	0.47	0.52
		0.1	0.9	0.55 ± 0.03	0.48	0.52
		-	1.0	0.50 ± 0.05	0.48	0.52
22	[C_4Chol]Br (1) and [C_4Py]Br (2)	1.0	-	0.52 ± 0.06	0.46	0.54
		0.9	0.1	0.51 ± 0.07	0.45	0.54
		0.8	0.2	0.51 ± 0.05	0.45	0.54
		0.7	0.3	0.47 ± 0.06	0.45	0.55
		0.6	0.4	0.44 ± 0.03	0.45	0.55
		0.5	0.5	0.48 ± 0.04	0.45	0.55
		0.4	0.6	0.52 ± 0.06	0.44	0.55
		0.3	0.7	0.48 ± 0.05	0.44	0.55
		0.2	0.8	0.49 ± 0.02	0.44	0.55
		0.1	0.9	0.49 ± 0.03	0.44	0.56
		-	1.0	0.53 ± 0.02	0.43	0.56
23	[C_4Chol]Br (1) and [C_4mim]Br (2)	1.0	-	0.49 ± 0.06	0.46	0.54
		0.9	0.1	0.45 ± 0.03	0.46	0.54
		0.8	0.2	0.47 ± 0.03	0.46	0.54
		0.7	0.3	0.47 ± 0.02	0.46	0.54
		0.6	0.4	0.47 ± 0.03	0.46	0.54
		0.5	0.5	0.50 ± 0.03	0.46	0.54
		0.4	0.6	0.50 ± 0.07	0.46	0.54
		0.3	0.7	0.51 ± 0.07	0.46	0.54
		0.2	0.8	0.51 ± 0.07	0.46	0.54
		0.1	0.9	0.53 ± 0.04	0.46	0.54
		-	1.0	0.52 ± 0.03	0.46	0.54
24	[C_4Py]Br (1) and [C_4mim]Br (2)	1.0	-	0.52 ± 0.04	0.46	0.53
		0.9	0.1	0.51 ± 0.05	0.46	0.53
		0.8	0.2	0.48 ± 0.02	0.47	0.53
		0.7	0.3	0.50 ± 0.02	0.47	0.53
		0.6	0.4	0.50 ± 0.02	0.47	0.52
		0.5	0.5	0.50 ± 0.02	0.47	0.52

Entry	Mixture	$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	P ± SE	$P^{-,d}$	$P^{+,e}$
		0.4	0.6	0.52 ± 0.02	0.47	0.52
		0.3	0.7	0.53 ± 0.03	0.48	0.52
		0.2	0.8	0.50 ± 0.03	0.48	0.52
		0.1	0.9	0.54 ± 0.02	0.48	0.52
		-	1.0	0.50 ± 0.03	0.48	0.52
25	[C_8Chol]Br (1) and [C_8Py]Br (2)	1.0	-	0.50 ± 0.01	0.48	0.52
		0.9	0.1	0.48 ± 0.07	0.48	0.52
		0.8	0.2	0.47 ± 0.04	0.48	0.52
		0.7	0.3	0.49 ± 0.06	0.48	0.52
		0.6	0.4	0.48 ± 0.04	0.48	0.52
		0.5	0.5	0.49 ± 0.02	0.48	0.52
		0.4	0.6	0.48 ± 0.03	0.48	0.52
		0.3	0.7	0.51 ± 0.03	0.48	0.52
		0.2	0.8	0.47 ± 0.03	0.48	0.52
		0.1	0.9	0.49 ± 0.03	0.47	0.52
		-	1.0	0.50 ± 0.03	0.47	0.52
26	[C_8Chol]Br (1) and [C_8mim]Br (2)	1.0	-	0.52 ± 0.04	0.48	0.52
		0.9	0.1	0.51 ± 0.01	0.48	0.52
		0.8	0.2	0.53 ± 0.03	0.48	0.52
		0.7	0.3	0.52 ± 0.03	0.48	0.52
		0.6	0.4	0.54 ± 0.03	0.48	0.52
		0.5	0.5	0.50 ± 0.06	0.48	0.52
		0.4	0.6	0.47 ± 0.04	0.48	0.52
		0.3	0.7	0.46 ± 0.02	0.48	0.52
		0.2	0.8	0.48 ± 0.05	0.48	0.52
		0.1	0.9	0.47 ± 0.03	0.48	0.52
		-	1.0	0.54 ± 0.03	0.48	0.52
27	[C_8Py]Br (1) and [C_8mim]Br (2)	1.0	-	0.50 ± 0.03	0.48	0.52
		0.9	0.1	0.48 ± 0.04	0.48	0.52
		0.8	0.2	0.51 ± 0.02	0.48	0.52
		0.7	0.3	0.52 ± 0.05	0.48	0.52
		0.6	0.4	0.52 ± 0.02	0.48	0.52
		0.5	0.5	0.51 ± 0.04	0.48	0.52
		0.4	0.6	0.49 ± 0.07	0.48	0.52
		0.3	0.7	0.47 ± 0.05	0.48	0.52
		0.2	0.8	0.51 ± 0.08	0.48	0.52
		0.1	0.9	0.50 ± 0.06	0.48	0.52
		-	1.0	0.50 ± 0.02	0.48	0.52
28	[$C_6H_5CH_2$Chol]Br (1) and [$C_6H_5CH_2$Py]Br (2)	1.0	-	0.50 ± 0.04	0.47	0.53
		0.9	0.1	0.51 ± 0.03	0.47	0.53
		0.8	0.2	0.51 ± 0.06	0.47	0.53
		0.7	0.3	0.52 ± 0.08	0.47	0.53
		0.6	0.4	0.48 ± 0.06	0.47	0.53
		0.5	0.5	0.47 ± 0.02	0.47	0.53
		0.4	0.6	0.51 ± 0.07	0.47	0.53
		0.3	0.7	0.49 ± 0.02	0.47	0.53
		0.2	0.8	0.50 ± 0.04	0.47	0.53
		0.1	0.9	0.53 ± 0.03	0.47	0.53
		-	1.0	0.50 ± 0.04	0.47	0.53
29	[$C_6H_5CH_2$Chol]Br (1) and [$C_6H_5CH_2$mim]Br (2)	1.0	-	0.53 ± 0.07	0.47	0.53
		0.9	0.1	0.51 ± 0.06	0.47	0.53
		0.8	0.2	0.49 ± 0.06	0.47	0.52
		0.7	0.3	0.50 ± 0.05	0.48	0.52

Entry	Mixture	$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	P ± SE	$P^{-,d}$	$P^{+,e}$
30	$[C_6H_5CH_2Py]Br$ (1) and $[C_6H_5CH_2mim]Br$ (2)	0.6	0.4	0.50 ± 0.05	0.48	0.52
		0.5	0.5	0.50 ± 0.04	0.48	0.52
		0.4	0.6	0.48 ± 0.08	0.48	0.52
		0.3	0.7	0.49 ± 0.09	0.48	0.52
		0.2	0.8	0.51 ± 0.07	0.49	0.51
		0.1	0.9	0.53 ± 0.09	0.49	0.51
		-	1.0	0.50 ± 0.04	0.49	0.51
		1.0	-	0.50 ± 0.04	0.47	0.52
		0.9	0.1	0.51 ± 0.03	0.48	0.52
		0.8	0.2	0.52 ± 0.05	0.48	0.52
		0.7	0.3	0.51 ± 0.08	0.48	0.52
		0.6	0.4	0.48 ± 0.04	0.48	0.52
		0.5	0.5	0.52 ± 0.04	0.48	0.52
		0.4	0.6	0.47 ± 0.03	0.48	0.51
		0.3	0.7	0.49 ± 0.05	0.49	0.51
		0.2	0.8	0.48 ± 0.02	0.49	0.51
		0.1	0.9	0.48 ± 0.04	0.49	0.51
		-	1.0	0.50 ± 0.04	0.49	0.51

[a]Concentration of compound *i* in the mixture. [b]EC_{50} of compound *i*. [c]Observed mixture viability. [d]See equation 3a in the main text. [e]See equation 3b in the main text.

Table 4. Concentration addition involving $[C_4Chol]Br$ (1), $[C_4Py]Br$ (2) and $[C_4mim]Br$ (3). Cells cultured for 24 hours in the absence of FBS.

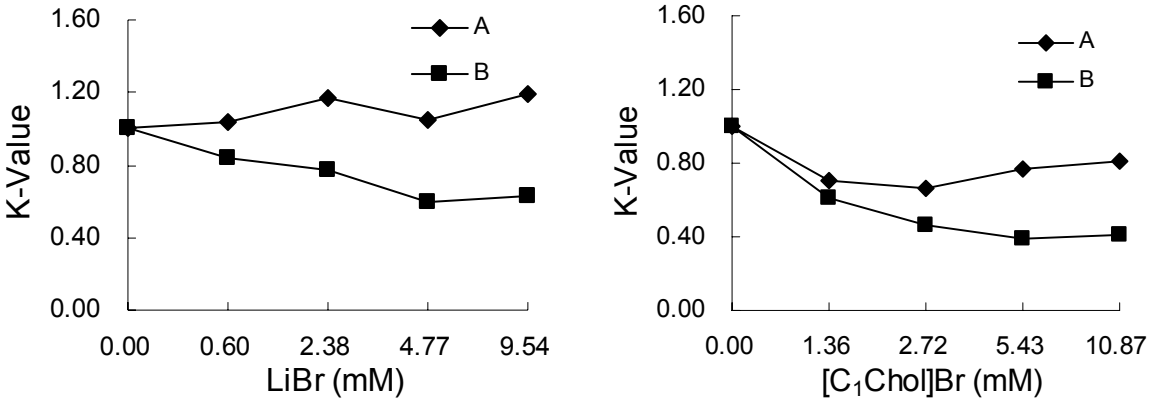
$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	$C_3/EC_{50,3}$	P ± SE	P^-	P^+
1.0	-	-	0.45 ± 0.02	0.46	0.53
-	1.0	-	0.47 ± 0.01	0.45	0.55
-	-	1.0	0.54 ± 0.03	0.46	0.53
0.5	0.5	-	0.53 ± 0.02	0.45	0.54
0.5	-	0.5	0.56 ± 0.01	0.46	0.53
-	0.5	0.5	0.49 ± 0.02	0.45	0.54
0.3	0.3	0.4	0.54 ± 0.06	0.46	0.54
0.4	0.3	0.3	0.55 ± 0.03	0.46	0.54
0.3	0.4	0.3	0.52 ± 0.05	0.46	0.54

3. K-value calculations for lithium bromide and choline bromide

Table 5. Concentration addition of LiBr and choline bromide to $[C_2mim]Br$ and $[C_8mim]Br$ and cells cultured for 24 hours in the absence of FBS.

Entry	Mixture	$C_1/EC_{50,1}$	$C_2/EC_{50,2}$	P ± SE	P^-	P^+
1	LiBr (1) and $[C_2mim]Br$ (2)	1.0	-	0.50 ± 0.01	0.48	0.52
		0.9	0.1	0.57 ± 0.02	0.48	0.52
		0.8	0.2	0.60 ± 0.03	0.48	0.52
		0.7	0.3	0.63 ± 0.04	0.48	0.52
		0.6	0.4	0.62 ± 0.04	0.48	0.52
		0.5	0.5	0.64 ± 0.05	0.48	0.52
		0.4	0.6	0.63 ± 0.05	0.48	0.52
		0.3	0.7	0.63 ± 0.04	0.47	0.53
		0.2	0.8	0.60 ± 0.07	0.47	0.53
		0.1	0.9	0.55 ± 0.02	0.47	0.53
		-	1.0	0.50 ± 0.03	0.47	0.53
2	LiBr (1) and $[C_8mim]Br$ (2)	1.0	-	0.49 ± 0.01	0.49	0.51
		0.9	0.1	0.49 ± 0.04	0.49	0.51
		0.8	0.2	0.52 ± 0.06	0.48	0.52
		0.7	0.3	0.52 ± 0.03	0.48	0.52
		0.6	0.4	0.53 ± 0.04	0.48	0.52
		0.5	0.5	0.57 ± 0.08	0.48	0.52
		0.4	0.6	0.64 ± 0.03	0.48	0.52
		0.3	0.7	0.64 ± 0.04	0.47	0.52
		0.2	0.8	0.63 ± 0.04	0.47	0.53
		0.1	0.9	0.58 ± 0.04	0.47	0.53
		-	1.0	0.53 ± 0.02	0.47	0.53
3	$[C_1Chol]Br$ (1) and $[C_2mim]Br$ (2)	1.0	-	0.50 ± 0.03	0.47	0.53
		0.9	0.1	0.65 ± 0.04	0.47	0.53
		0.8	0.2	0.66 ± 0.06	0.47	0.53
		0.7	0.3	0.72 ± 0.03	0.47	0.53
		0.6	0.4	0.78 ± 0.08	0.47	0.53
		0.5	0.5	0.74 ± 0.06	0.47	0.53
		0.4	0.6	0.65 ± 0.10	0.47	0.53
		0.3	0.7	0.65 ± 0.07	0.47	0.53
		0.2	0.8	0.63 ± 0.08	0.47	0.53
		0.1	0.9	0.63 ± 0.07	0.47	0.53
		-	1.0	0.50 ± 0.04	0.47	0.53
4	$[C_1Chol]Br$ (1) and $[C_8mim]Br$ (2)	1.0	-	0.51 ± 0.03	0.48	0.52
		0.9	0.1	0.63 ± 0.06	0.47	0.52
		0.8	0.2	0.66 ± 0.05	0.47	0.53
		0.7	0.3	0.72 ± 0.04	0.47	0.53
		0.6	0.4	0.75 ± 0.08	0.47	0.53
		0.5	0.5	0.76 ± 0.04	0.47	0.53
		0.4	0.6	0.61 ± 0.04	0.47	0.53
		0.3	0.7	0.53 ± 0.03	0.47	0.53
		0.2	0.8	0.55 ± 0.05	0.46	0.53
		0.1	0.9	0.54 ± 0.03	0.46	0.54
		-	1.0	0.50 ± 0.02	0.46	0.54

Figure 1. K-value plot for LiBr and choline bromide ([C_1Chol]Br) when hypotoxic quantities are added to [C_2mim]Br (A) and [C_8mim]Br (B).



4. Changes of mitochondrial membrane potential and reactive oxygen species in HeLa cells cultured with [C_2mim][BF_4].

Figure 2. Change of mitochondrial membrane potential of HeLa cells cultured with or without [C_2mim][BF_4] for 48 hours detected by Rhodamine 123. A: negative control, unstained cells; B: positive control, stained normal cells; C: treatment, stained cells cultured with [C_2mim][BF_4] (6.3 mM); D: combination of B and C.

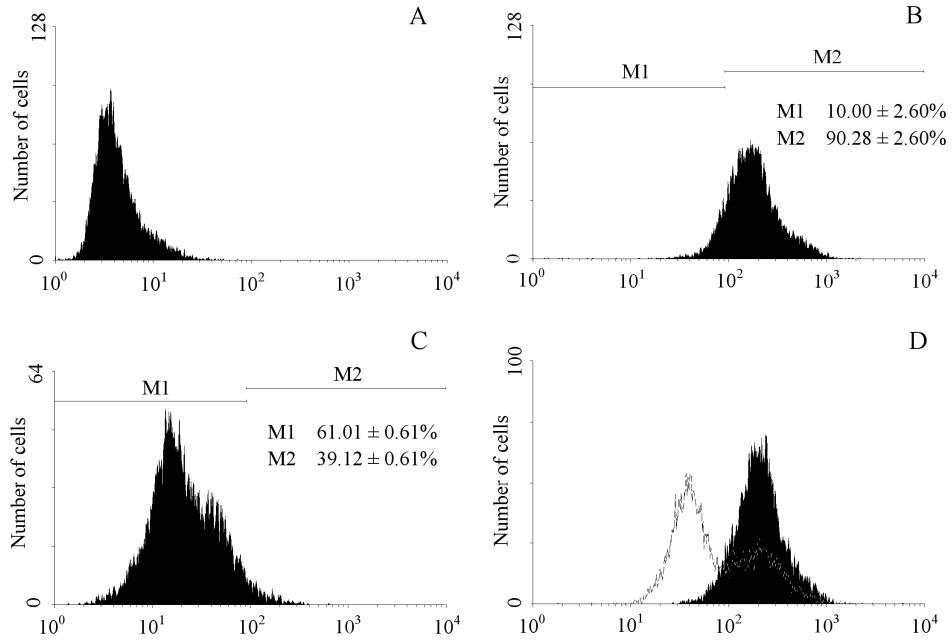
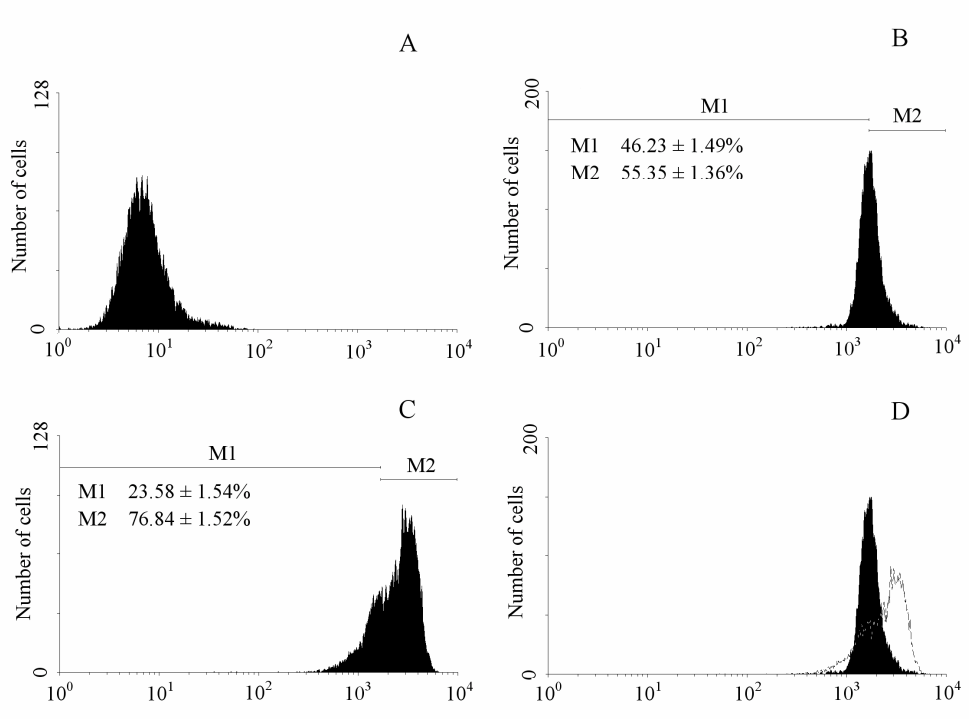


Figure 3. Reactive oxygen species (ROS) production of HeLa cells cultured with or without $[C_2mim][BF_4]$ for 48 hours A: negative control, unstained cells; B: positive control, stained normal cells; C: treatment, stained cells cultured with $[C_2mim][BF_4]$ (6.3 mM); D: combination of B and C.



5. Derivation of equations 3a and 3b in the main text.

Equations 3a and 3b were derived from equation 2 in reference 33 in the main paper. The relationship between P and R can be described through equation S.1

$$P = 1 - R \qquad \text{S.1}$$

As ρ and b denote the same term, and ρ' being the simple average of the ρ for each chemical ($\rho' = \frac{\sum_{i=1}^{n} \rho_i}{n}$) in the mixture, equation 2 from Rider and LeBlanc can be written as

$$P = 1 - R = 1 - \frac{1}{1 + \frac{1}{(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i}})^{\rho'}}} = 1 - \frac{1}{1 + \frac{1}{(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i}})^{\frac{\sum_{i=1}^{n} \rho_i}{n}}}} = 1 - \frac{1}{1 + \frac{1}{(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i}})^{\frac{\sum_{i=1}^{n} b_i}{n}}}} \qquad \text{S.2}$$

If the confidence intervals of EC_{50} and b (at 95% confidence level) are taken into account, we get

$$P = 1 - \frac{1}{1 + \frac{1}{(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i} \pm \frac{1.96 SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n} b_i \pm \frac{1.96 SE_{b,i}}{\sqrt{s_i}}}{n}}}} \qquad \text{S.3}$$

where SE denotes standard error and s_i is the sample size for compound i.
Since the concentrations were chosen so that

$$\sum_{i=1}^{n} \frac{C_i}{EC_{50,i}} = 1, \qquad \text{S.4}$$

the following relationships are observed for $SE_{EC50,i}>0$ and $SE_{b,i}>0$

$$(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i} + \frac{1.96 SE_{EC_{50},i}}{\sqrt{s_i}}}) < 1 \qquad \text{S.5}$$

and

$$(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i} - \frac{1.96 SE_{EC_{50},i}}{\sqrt{s_i}}}) > 1 \qquad \text{S.6}$$

so that

$$(\sum_{i=1}^{n} \frac{C_i}{EC_{50,i} + \frac{1.96 SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n} b_i + \frac{1.96 SE_{b,i}}{\sqrt{s_i}}}{n}} < (\sum_{i=1}^{n} \frac{C_i}{EC_{50,i} + \frac{1.96 SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n} b_i - \frac{1.96 SE_{b,i}}{\sqrt{s_i}}}{n}} \qquad \text{S.7}$$

and

$$(\sum_{i=1}^{n}\frac{C_i}{EC_{50,i}-\frac{1.96SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n}b_i+\frac{1.96SE_{b,i}}{\sqrt{s_i}}}{n}} > (\sum_{i=1}^{n}\frac{C_i}{EC_{50,i}-\frac{1.96SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n}b_i-\frac{1.96SE_{b,i}}{\sqrt{s_i}}}{n}} \quad \text{S.8}$$

Then the upper and lower limits of the confidence interval of P (P^+ denoting the upper limit, and P^- denoting the lower limit) will be

$$P^+ = 1-\frac{1}{1+\frac{1}{(\sum_{i=1}^{n}\frac{C_i}{EC_{50,i}+\frac{1.96SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n}b_i+\frac{1.96SE_{b,i}}{\sqrt{s_i}}}{n}}}} \quad \text{S.9}$$

and

$$P^- = 1-\frac{1}{1+\frac{1}{(\sum_{i=1}^{n}\frac{C_i}{EC_{50,i}-\frac{1.96SE_{EC_{50},i}}{\sqrt{s_i}}})^{\frac{\sum_{i=1}^{n}b_i+\frac{1.96SE_{b,i}}{\sqrt{s_i}}}{n}}}} \quad \text{S.10}$$

Equations S.9 and S.10 are identical to equations 3a and 3b in the main text.