Quantitative structure–toxicity relationship in bioactive molecules from a conceptual DFT perspective

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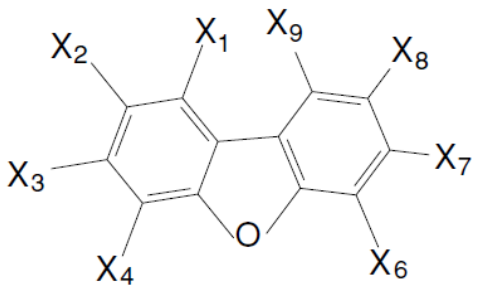
SUPPLIMENTARY INFORMATION

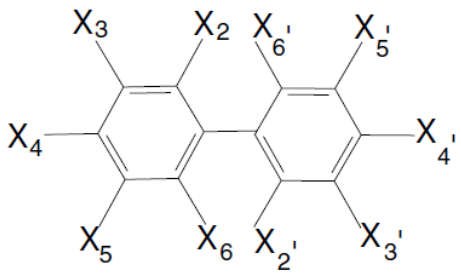
Table S1: Polychlorinated dibenzofurans with identity number (ID) representing the substitution pattern. (reprinted from ref. [77] with permission from Springer Nature. Copyright © 2006, Springer Science Business Media, Inc.)



ID	X_1	X_2	X_3	X_4	X_6	X_7	X_8	X_9
1	H	Cl	H	H	H	H	H	H
2	H	H	H	Cl	H	H	H	H
3	H	Cl	H	H	Cl	H	H	H
4	H	Cl	H	H	H	H	Cl	H
5	Cl	H	Cl	H	Cl	H	H	H
6	Cl	H	Cl	H	H	H	Cl	H
7	H	Cl	Cl	Cl	H	H	H	H
8	H	Cl	Cl	H	H	H	Cl	H
9	H	Cl	H	H	Cl	Cl	H	H
10	H	Cl	Cl	Cl	Cl	H	H	H
11	H	Cl	Cl	Cl	H	H	Cl	H
12	H	Cl	Cl	H	H	Cl	Cl	H
13	Cl	Cl	H	Cl	Cl	Cl	H	H
14	Cl	Cl	Cl	Cl	H	H	Cl	H
15	Cl	Cl	Cl	H	H	Cl	Cl	H
16	H	Cl	Cl	Cl	H	Cl	Cl	H

17	Cl	Cl	Cl	Cl	H	Cl	Cl	H
18	H	Cl	Cl	Cl	Cl	Cl	Cl	H
19	H	Cl	Cl	H	Cl	H	Cl	H
20	Cl	Cl	Cl	H	Cl	H	H	H
21	Cl	Cl	Cl	H	H	Cl	H	H
22	Cl	H	Cl	Cl	H	Cl	Cl	H
23	H	Cl	Cl	Cl	H	Cl	H	Cl
24	Cl	Cl	Cl	H	H	Cl	H	Cl
25	Cl	Cl	Cl	H	H	Cl	H	H
26	Cl	H	Cl	Cl	H	Cl	Cl	H
27	H	Cl	Cl	Cl	H	Cl	H	Cl

Table S2: Polychlorinated biphenyls with identity number (ID) rep-resenting the substitution pattern. (reprinted from ref. [77] with permission from Springer Nature. Copyright © 2006, Springer Science Business Media, Inc.)



ID	X_2	X_3	X_4	X_5	X_6	$X_{2'}$	$X_{3'}$	$X_{4'}$	$X_{5'}$	$X_{6'}$
28	Cl	H	H	H	H	H	Cl	Cl	Cl	H
29	Cl	Cl	Cl	H	H	H	Cl	Cl	H	H
30	Cl	H	Cl	Cl	H	H	Cl	Cl	H	H
31	Cl	Cl	Cl	Cl	H	H	Cl	Cl	H	H
32	Cl	H	Cl	H	H	Cl	H	Cl	H	H
33	Cl	H	Cl	H	Cl	H	Cl	Cl	Cl	H

Table S3: Dataset of 252 aliphatic compounds considered against *Tetrahymena pyriformis*. [78]

	Alcohols: amino alcohols
1	2-(Methylamino)ethanol
2	4-Amino-1-butanol
3	2-(Ethylamino)ethanol
4	2-Propylaminoethanol
5	DL-2-Amino-1-pentanol
6	3-Amino-2,2-dimethyl-1-propanol
7	6-Amino-1-hexanol
8	DL-2-Amino-1-hexanol
9	DL-2-Amino-3-methyl-1-butanol
10	2-Amino-3,3-dimethyl-butanol
11	2-Amino-3-methyl-1-pentanol
12	2-Amino-4-methyl-pentanol
13	2-(*tert*-Butylamino)ethanol
14	Diethanolamine
15	1,3-Diamino-2-hydroxy-propane
16	*N*-Methyldiethanol amine
17	3-(Methylamino)-1,2-propanediol
18	Triethanolamine
	α-Acetylenic alcohols
1	3-Butyn-2-ol
2	1-Pentyn-3-ol
3	2-Pentyn-1-ol
4	2-Penten-4-yn-1-ol
5	1-Hexyn-3-ol
6	1-Heptyn-3-ol
7	4-Heptyn-3-ol
8	2-Octyn-1-ol
9	2-Nonyn-1-ol
10	2-Decyn-1-ol
11	2-Tridecyn-1-ol
12	4-Methyl-1-pentyn-3-ol
13	4-Methyl-1-heptyn-3-ol
	Diols
1	(±)-1,2-Butanediol
2	(±)-1,3-Butanediol
3	1,4-Butanediol
4	1,2-Pentanediol
5	1,5-Pentanediol
6	2-Methyl-2,4-pentanediol
7	(±)-1,2-Hexanediol
8	1,6-Hexanediol
9	1,2-Decanediol
10	1,10-Decanediol
	Halogenated alcohols
1	2-Bromoethanol
2	2-Chloroethanol
3	1-Chloro-2-propanol
4	3-Chloro-1-propanol
5	4-Chloro-1-butanol
6	3-Chloro-2,2-dimethyl-1-propanol
7	6-Chloro-1-hexanol
8	8-Chloro-1-octanol
9	6-Bromo-1-hexanol
10	8-Bromo-1-octanol
11	2,3-Dibromopropanol

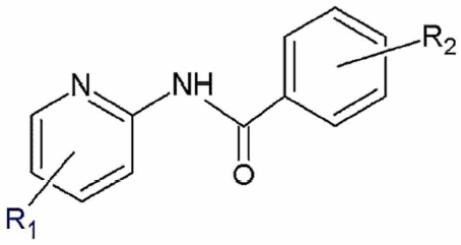
	Saturated alcohols
1	Methyl alcohol
2	Ethyl alcohol
3	1-Propanol
4	2-Propanol
5	1-Butanol
6	(±)-2-Butanol
7	2-Methyl-1-propanol
8	2-Pentanol
9	3-Pentanol
10	3-Methyl-2-butanol
11	tert-Amylalcohol
12	2-Methyl-1-butanol
13	3-Methyl-1-butanol
14	2,2-Dimethyl-1-propanol
15	2-Methyl-2-propanol
16	1-Hexanol
17	3,3-Dimethyl-1-butanol
18	4-Methyl-1-pentanol
19	1-Heptanol
20	2,4-Dimethyl-3-pentanol
21	1-Octanol
22	2-Octanol
23	3-Octanol
24	1-Nonanol
25	2-Nonanol
26	3-Ethyl-2,2-dimethyl-3-pentanol
27	1-Decanol
28	(±)-4-Decanol
29	3,7-Dimethyl-3-octanol
30	1-Undecanol
31	1-Dodecanol
32	1-Tridecanol
	Unsaturated alcohols
1	2-Methyl-3-buten-2-ol
2	4-Pentyn-1-ol
3	2-Methyl-3-butyn-2-ol
4	*trans*-3-Hexen-1-ol
5	*cis*-3-Hexen-1-ol
6	5-Hexyn-1-ol
7	3-Methyl-1-pentyn-3-ol
8	4-Hexen-1-ol
9	5-Hexen-1-ol
10	4-Pentyn-2-ol
11	5-Hexyn-3-ol
12	3-Heptyn-1-ol
13	4-Heptyn-2-ol
14	3-Octyn-1-ol
15	3-Nonyn-1-ol
16	2-Propen-1-ol
17	2-Buten-1-ol
18	(±)-3-Buten-2-ol
19	*cis*-2-Buten-1,4-diol
20	*cis*-2-Penten-1-ol
21	3-Penten-2-ol
22	*trans*-2-Hexen-1-ol

23	1-Hexen-3-ol
24	*cis*-2-Hexen-1-ol
25	*trans*-2-Octen-1-ol
	Acids: carboxylic acids
1	Propanoic acid
2	Butyric acid
3	Valeric acid
4	Hexanoic acid
5	Heptanoic acid
6	Octanoic acid
7	Nonanoic acid
8	Decanoic acid
9	Undecanoic acid
10	*iso*-Butyric acid
11	Isovalerianic acid
12	Trimethylacetic acid
13	3-Methylvaleric acid
14	4-Methylvaleric acid
15	2-Ethylbutyric acid
16	2-Propylpentanoic acid
17	2-Ethylhexanoic acid
18	Succinic acid
19	Glutaric acid
20	Adipic acid
21	Pimelic acid
22	3,3-Dimethylglutaric acid
23	Suberic acid
24	Sebacic acid
25	1,10-Decanedicarboxylic acid
26	Crotonic acid
27	*trans*-2-Pentenoic acid
28	*trans*-2-Hexenoic acid
	Halogenated acids
1	4-Bromobutyric acid
2	5-Bromovaleric acid
3	4-Chlorobutyric acid
4	3-Chloropropionic acid
5	5-Chlorovaleric acid
6	2-Bromobutyric acid
7	2-Bromoisobutyric acid
8	2-Bromoisovaleric acid
9	2-Bromovaleric acid
10	2-Bromooctanoic acid
11	2-Bromohexanoic acid
	Esters: monoesters
1	Ethyl acetate
2	Propyl acetate
3	Isopropyl acetate
4	Butyl acetate
5	Amyl acetate
6	Hexyl acetate
7	Octyl acetate
8	Decyl acetate
9	Ethyl propionate
10	Butyl propionate
11	Isobutyl propionate

(Table S3 continued…)

	Esters: monoesters *(continued)*
12	Propyl propionate
13	*tert*-Butyl propionate
14	Ethyl butyrate
15	Ethyl isobutyrate
16	Ethyl valerate
17	Propyl butyrate
18	Butyl butyrate
19	Propyl valerate
20	Amyl propionate
21	Ethyl hexanoate
22	Methyl butyrate
23	Methyl valerate
24	Methyl hexanoate
25	Methyl heptanoate
26	Methyl octanoate
27	Methyl nonanoate
28	Methyl decanoate
29	Methyl undecanoate
30	Methyl formate
31	*tert*-Butyl formate
	Diesters
1	Diethyl malonate
2	Diethyl sebacate
3	Diethyl suberate
4	Diethyl succinate
5	Dimethyl malonate
6	Dibutyl adipate
7	Dimethyl succinate
8	Diethyl adipate
9	Dimethyl brassylate
10	Dimethyl sebacate
11	Dimethyl suberate
12	Diethyl pimelate
13	Dibutyl suberate
14	Diethyl butylmalonate
15	Diethyl ethylmalonate
16	Diethyl 3-oxopimelate
17	Diethyl 4-oxopimelate
18	Diethyl methylmalonate
19	Diethyl propylmalonate
20	Dibutyl succinate
	Aldehydes
1	Propionaldehyde
2	Butyraldehyde
3	Isobutyraldehyde
4	Valeraldehyde
5	2-Methyl-butyraldehyde
6	Hexylaldehyde
7	2-Methylvaleraldehyde
8	2-Ethylbutyraldehyde
9	3,3-Dimethylbutyraldehyde
10	Heptaldehyde
11	2-Ethylhexanal
12	*trans*-4-Decen-1-al
13	*cis*-7-Decen-1-al
	Ketones
1	Acetone
2	2-Butanone
3	2-Pentanone
4	3-Pentanone
5	4-Methyl-2-pentanone
6	2-Heptanone
7	5-Methyl-2-hexanone
8	4-Heptanone
9	2-Octanone
10	2-Nonanone
11	2-Decanone
12	3-Decanone
13	2-Undecanone
14	2-Dodecanone
15	7-Tridecanone
	Amines
1	Propylamine
2	Butylamine
3	*N*-Methylpropylamine
4	Amylamine
5	*N*-Methylbutylamine
6	Hexylamine
7	Isopropylamine
8	Isobutylamine
9	*N*,*N*-Dimethylethylamine
10	(±)-*sec*-Butylamine
11	Isoamylamine
12	1-Methylbutylamine
13	1-Ethylpropylamine
14	2-Methylbutylamine
15	*N*,*N*-Diethylmethylamine
16	*tert*-Butylamine
17	*tert*-Amylamine
18	(±)-1,2-Dimethylpropylamine
19	Propargylamine
20	N-Methylpropargylamine
21	1-Dimethylamino-2-propyne
22	1,1-Dimethylpropargylamine
23	2-Methoxyethylamine
24	3-Methoxypropylamine
25	3-Ethoxypropylamine

Table S4: The dataset of 32 pyridyl benzamides considered against *Trypanosoma brucei* (reprinted from Ref. [79]. © 2019, IGI Global)



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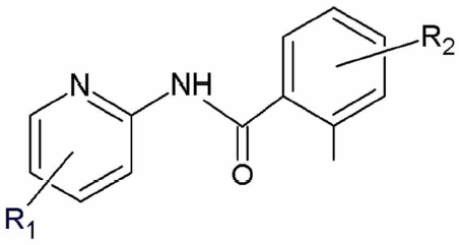

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Sl. No.	R_1	R_2	Expt. pIC_{50}	ω	ω^2
1	H	2-Me	5.5190	0.37	0.14
2	4-CN	2-Me	5.6380	0.60	0.36
3	4-Me	2-Me	5.6780	0.36	0.13
4	4-Cl	2-Me	5.6780	0.44	0.19
5	4-Br	2-Me	5.7450	0.44	0.19
6	4-F	2-Me	6.2920	0.43	0.18
7	4-C≡CPh	2-Me	5.7700	0.47	0.22
8	4-C≡CCH_2-iPr	2-Me	5.9590	0.40	0.16
9	4-Ph	2-Me	5.6990	0.40	0.16
10	5-OMe	2-Me	5.4200	0.35	0.12
11	6-CH=$CH(CH_2)_2CH_3$	2-Me	5.2220	0.31	0.10
12	6-NH_2	2-Me	5.3370	0.30	0.09
13	H	H	5.0420	0.40	0.16
14	H	2-Et	5.5620	0.36	0.13
15	H	2-Me, 3-F	6.0510	0.41	0.17
16	H	3-F	5.1350	0.46	0.21
17	H	2-Me, 3-Cl	6.2010	0.40	0.16
18	H	2-Me, 3-Br	5.2440	0.41	0.16
19	H	2,3-diMe	5.4560	0.34	0.11
20	H	2-Me, 4-F	5.7210	0.38	0.15
21	H	2-Me, 4-Cl	5.9590	0.43	0.19
22	H	2-Me, 4-Br	5.9590	0.44	0.19
23	H	2,4-diMe	6.0090	0.36	0.13
24	H	3-F, 4-F	6.3870	0.47	0.22
25	4-Me	3-F	6.0810	0.48	0.23
26	4-Me	3-F, 4-F	6.0460	0.46	0.21
27	4-Cl	3-F	6.3280	0.53	0.28
28	4-Cl	3-F, 4-F	6.2760	0.54	0.30
29	4-F	3-F	7.0000	0.52	0.27
30	4-F	3-F, 4-F	6.7210	0.53	0.29
31	5-OMe	3-F	5.6380	0.43	0.19
32	5-OMe	4-F	5.5850	0.39	0.15