AA-JSM-LTJK-THE_SI

Supporting Information (SI)

Estrogenic activity of lignin-derivable alternatives to bisphenol A assessed *via* molecular docking simulations

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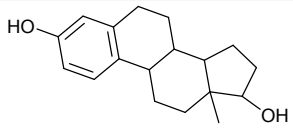
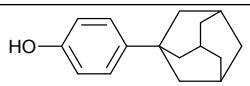
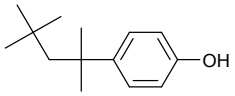
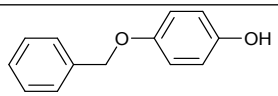
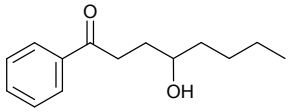
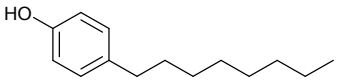
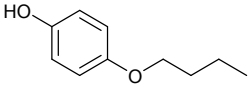
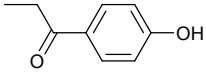
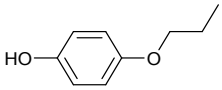
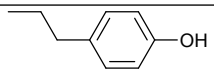
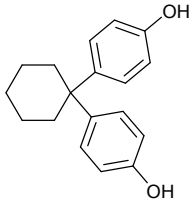
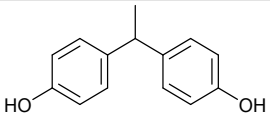
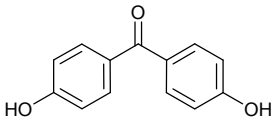
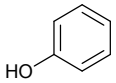
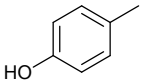
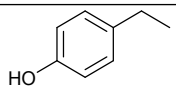
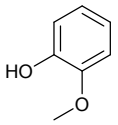
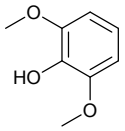
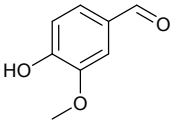
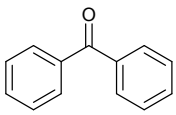
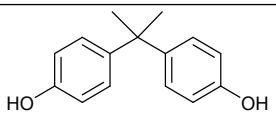
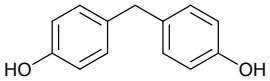
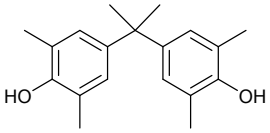
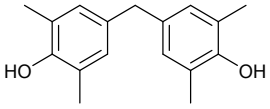
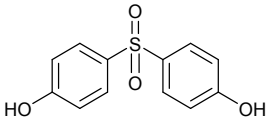
Number of Figures: 1

Table S1: Binding affinities and median effective concentration (EC_{50})[1] values for 17β-estradiol (E2) and various commercial (bis)phenols. Further information about the binding affinity calculations using AutoDock Vina 4.0 software[2] is provided in the Experimental section of the main text.

Compound	Binding affinity (kcal/mol)	EC_{50} (μM)[1]	$Log(EC_{50}^{-1})$
 E2	-10.6	3.9×10^{-5}	10.4
 4-(1-adamantyl)phenol	-9.0	8.5×10^{-3}	8.0
 4-*tert*-octylphenol	-7.3	1.7×10^{-1}	6.7
 4-benzyloxyphenol	-7.1	5.4×10^{-1}	6.2
 4-hydroxyoctanophenone	-6.9	8.8×10^{-1}	6.0
 4-octylphenol	-6.5	1.8×10^{0}	5.7
 4-butoxyphenol	-5.9	1.8×10^{1}	4.7
 4-hydroxypropriophenone	-5.7	8.3×10^{1}	4.0
 4-propoxyphenol	-5.2	1.6×10^{2}	3.8

 4-propylphenol	-5.6	1.5×10^{2}	3.8
 4,4-cyclohexylidene bisphenol	-9.6	4.3×10^{-3}	8.3
 4,4-ethylidene bisphenol	-8.1	2.2×10^{-1}	6.6
 4,4-dihydroxybenzophenone	-8.1	6.3×10^{-1}	6.2
 Phenol	-4.9	Not detectable estrogenic activity (EA)	-
 4-methylphenol	-5.7	Not detectable EA	-
 4-ethylphenol	-5.6	Not detectable EA	-
 Guaiacol	-5.3	-	-
 Syringol	-5.1	-	-
 Vanillin	-5.9	Not detectable EA[3]	-

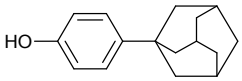
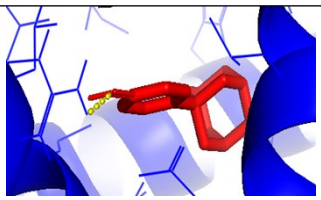
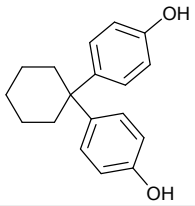
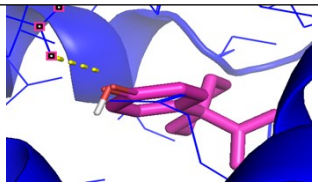
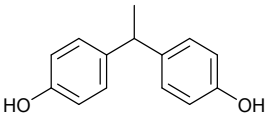
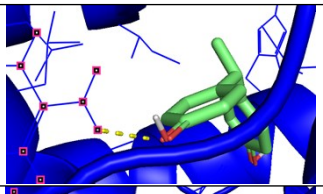
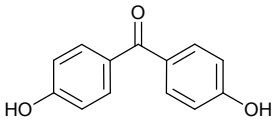
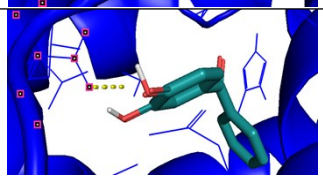
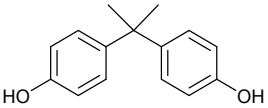
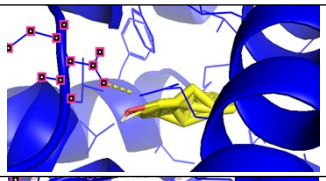
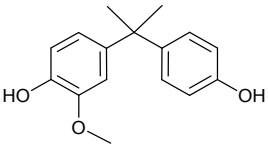
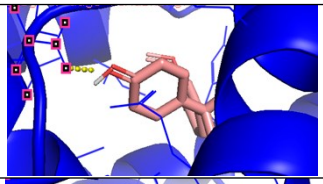
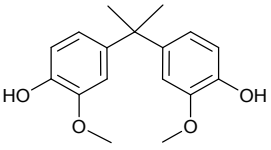
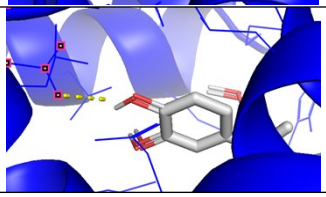
 Benzophenone	-6.3	Not detectable EA	-
 Bisphenol A (BPA)	-8.5	4.2×10^{-1}	6.3
 Bisphenol F (BPF)	-7.7	8.1×10^{-3}	8.1
 Tetramethyl bisphenol A	-8.2	-	-
 Tetramethyl bisphenol F	-8.3	-	-
 Bisphenol S	-7.9	-	-

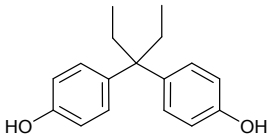
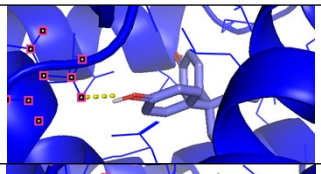
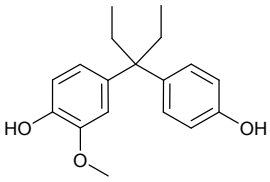
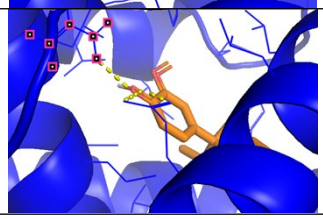
Nomenclature of the bisphenols reported in this study

Bisphenols as a function of methoxy-group content (from 0 to 4) and with an unsubstituted, dimethyl-substituted, diethyl-substituted, or dimethoxy-substituted bridging carbon were analyzed and are shown in Table 1. The nomenclature of the compounds in this study indicates the number of methoxy substituents and the type of bridging functional group. For example, BP(0,1)(Un) denotes a bisphenol with zero methoxy groups on the right-most aromatic ring, one methoxy group on the left-most aromatic ring, and an unsubstituted bridging carbon. Similarly, BP(1,2)(Me) indicates a bisphenol with one methoxy group on the right-most aromatic ring, two methoxy groups on the left-most ring, and a dimethyl-substituted bridging carbon. Additional molecules are described in a similar fashion using Et for a diethyl-substituted bridging carbon and MeO for a dimethoxy-substituted bridging carbon.

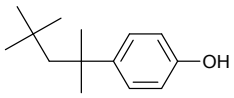
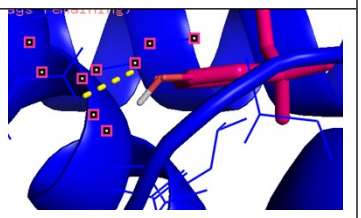
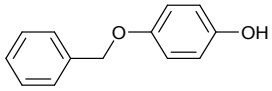
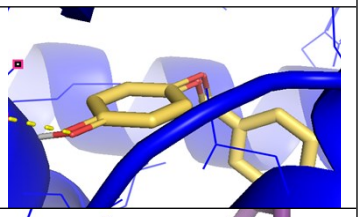
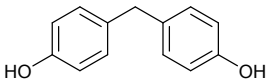
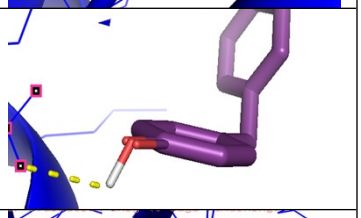
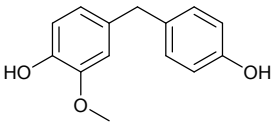
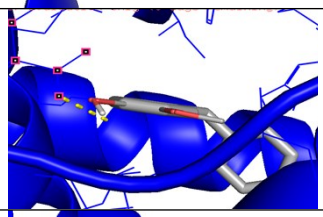
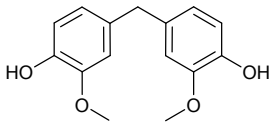
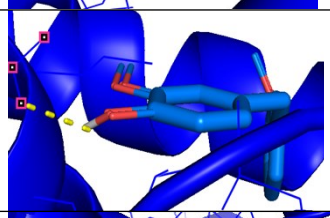
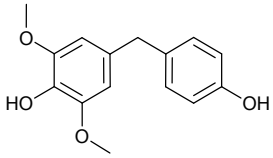
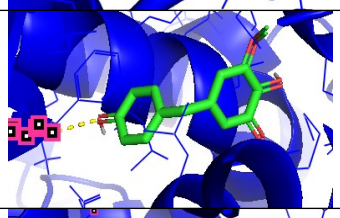
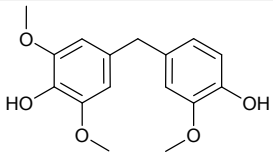
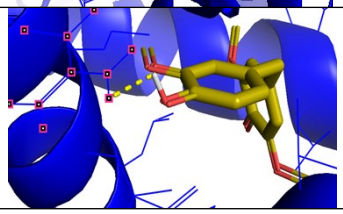
Table S2: Binding locations of analyzed compounds obtained using AutoDock Vina.

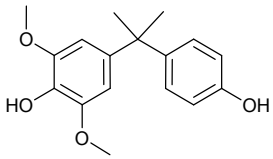
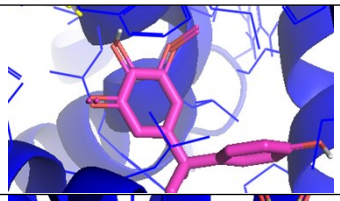
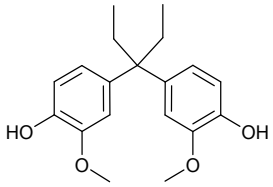
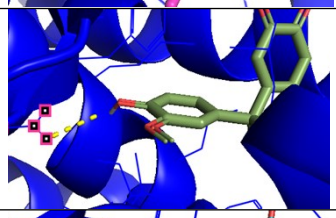
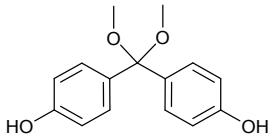
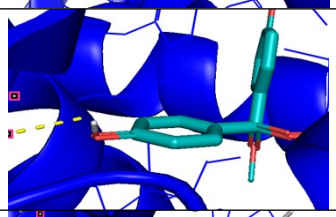
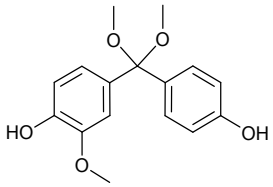
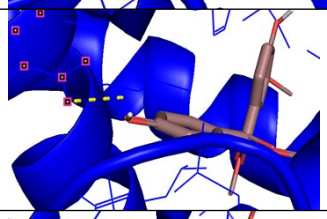
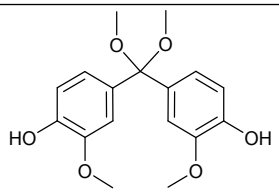
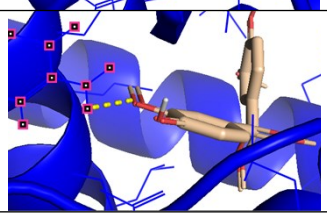
a) Compounds with binding affinities stronger than -8.0 kcal/mol (*i.e.,* more negative than -8.0 kcal/mol)

Compound	Structure	Binding affinity (kcal/mol)	Binding locations	Binding visualization
4-(1-adamantyl) phenol		-9.0	-OH binding at arginine (ARG) 394	
4,4-cyclohexylidene bisphenol		-9.6	-OH binding at ARG 394	
4,4-ethylidene bisphenol		-8.1	-OH binding at ARG 394	
4,4-dihydroxy-benzophenone		-8.1	-OH binding at ARG 394	
BP(0,0)(Me) [BPA]		-8.5	-OH binding at ARG 394	
BP(0,1)(Me)		-8.4	-OH binding at ARG 394	
BP(1,1)(Me)		-8.6	-OH binding at ARG 394	

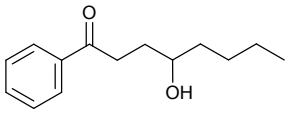
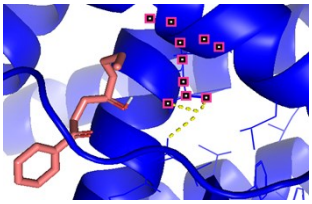
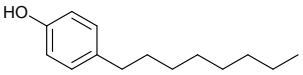
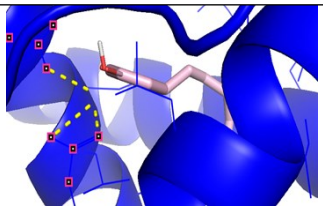
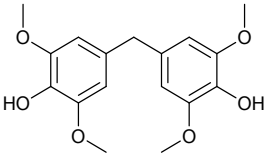
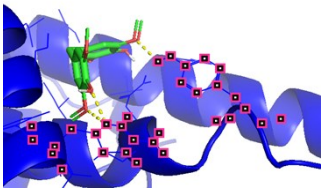
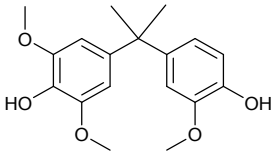
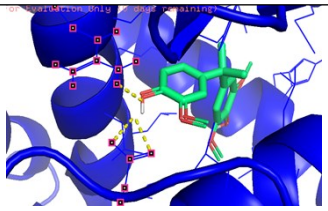
BP(0,0)(Et)		-8.3	-OH binding at ARG 394	
BP(0,1)(Et)		-8.1	-OH binding at ARG 394	

b) Compounds with binding affinities between -8.0 kcal/mol and -7.0 kcal/mol

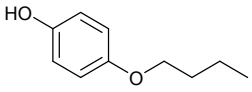
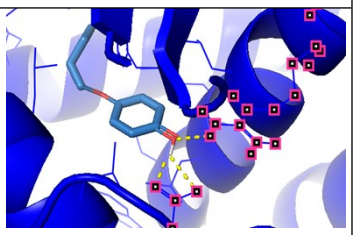
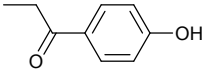
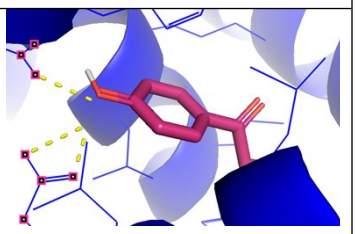
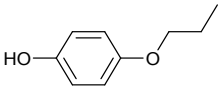
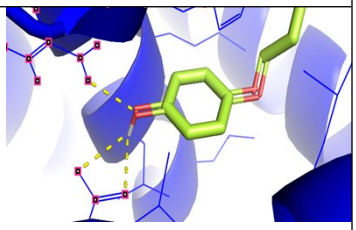
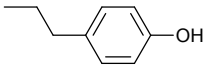
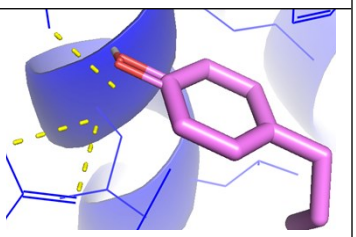
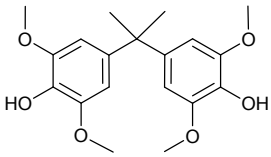
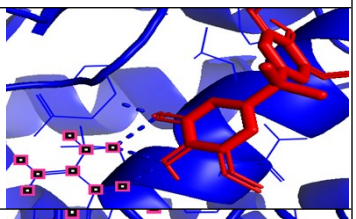
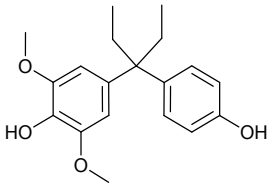
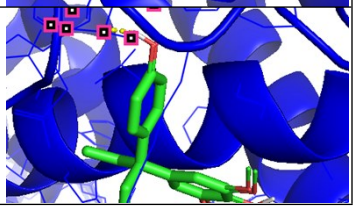
Compound	Structure	Binding affinity (kcal/mol)	Binding locations	Binding visualization
4-*tert*-octylphenol		-7.3	-OH binding at methionine (MET) 388	
4-benzyloxyphenol		-7.1	-OH binding at ARG 394	
BP(0,0)(Un) [BPF]		-7.7	-OH binding at ARG 394	
BP(0,1)(Un)		-7.9	-OH binding at ARG 394	
BP(1,1)(Un)		-8.0	-OH binding at ARG 394	
BP(0,2)(Un)		-7.1	-OH binding at ARG 394	
BP(1,2)(Un)		-7.5	-OH binding at ARG 394	

BP(0,2)(Me)		-7.6	-OH binding at ARG 394	
BP(1,1)(Et)		-7.7	-OH binding at ARG 394	
BP(0,0)(MeO)		-7.6	-OH binding at ARG 394	
BP(0,1)(MeO)		-7.7	-OH binding at ARG 394	
BP(1,1)(MeO)		-7.5	-OH binding at ARG 394	

c) Compounds with binding affinities between -7.0 kcal/mol and -6.0 kcal/mol

Compound	Structure	Binding affinity (kcal/mol)	Binding locations	Binding visualization
4-hydroxy-octanophenone		-6.9	-OH binding at glutamic acid (GLU) 353	
4-octylphenol		-6.3	-OH binding at GLU 353 and ARG 394	
BP(2,2)(Un)		-6.3	-OH binding at ARG 515 and tyrosine (TYR) 459	
BP(1,2)(Me)		-6.1	-OH binding at GLU 353 and ARG 394	

d) Compounds with binding affinities weaker than -6.0 kcal/mol

Compound	Structure	Binding affinity (kcal/mol)	Binding locations	Binding visualization
4-butoxyphenol		-5.9	-OH binding at GLU 353 and ARG 394	
4-hydroxy-propriophenone		-5.7	-OH binding at GLU 353 and ARG 394	
4-propoxyphenol		-5.2	-OH binding at GLU 353 and ARG 394	
4-propylphenol		-5.6	-OH binding at GLU 353 and ARG 394	
BP(2,2)(Me)		-5.9	-OH binding at ARG 352	
BP(0,2)(Et)		-5.9	-OH binding at MET 396	

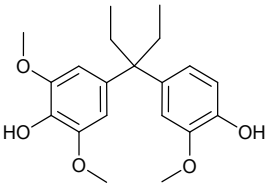
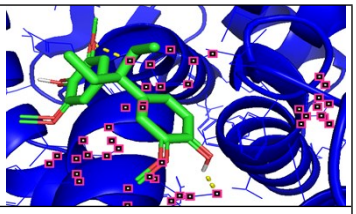
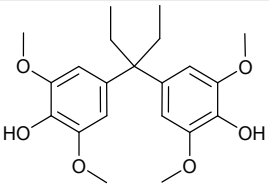
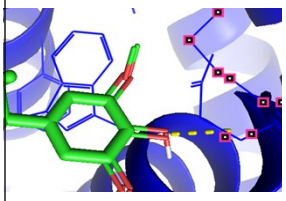
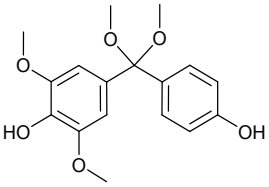
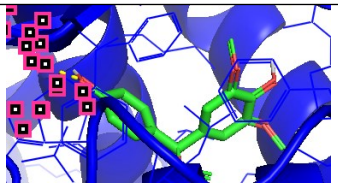
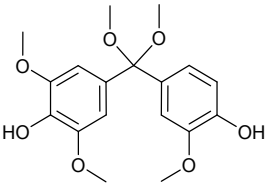
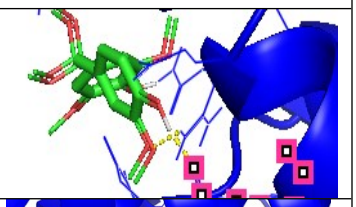
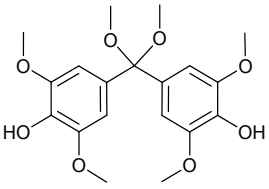
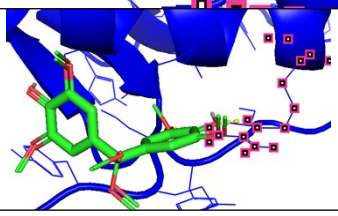
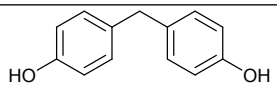
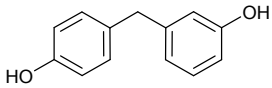
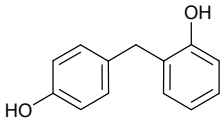
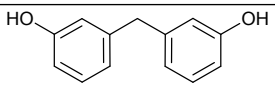
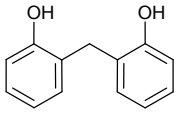
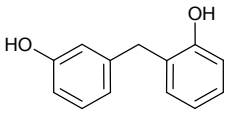
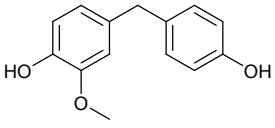
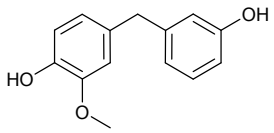
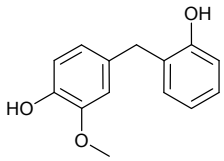
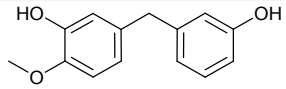
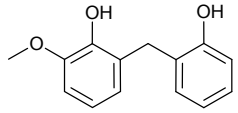
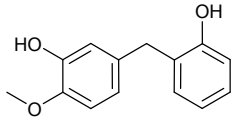
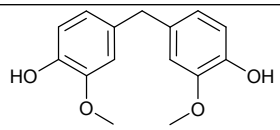
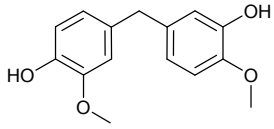
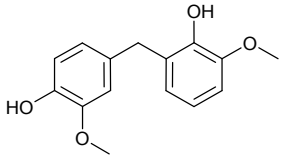
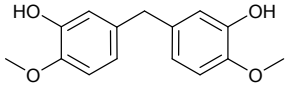
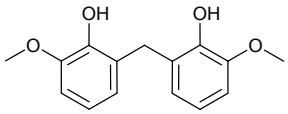
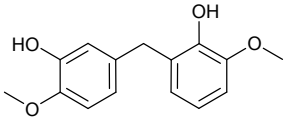
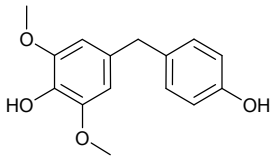
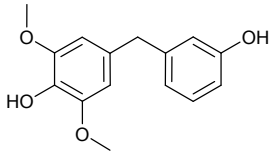
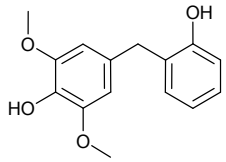
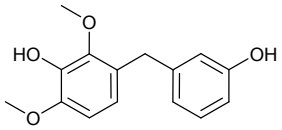
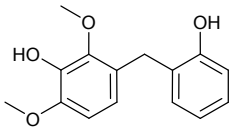
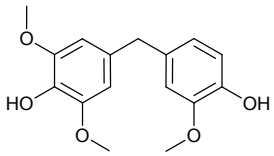
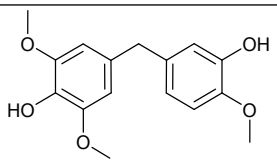
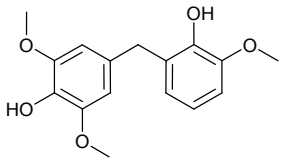
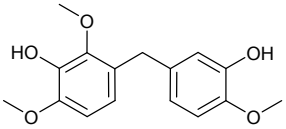
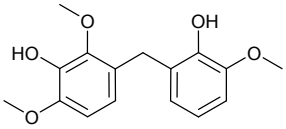
BP(1,2)(Et)		-5.6	-OH binding at ARG 394	
BP(2,2)(Et)		-5.4	-OH binding at MET 396	
BP(0,2)(MeO)		-5.7	-OH binding at ARG 394	
BP(1,2)(MeO)		-5.6	-OH binding at ARG 503	
BP(2,2)(MeO)		-5.3	-OH binding at ARG 352	

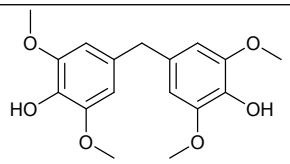
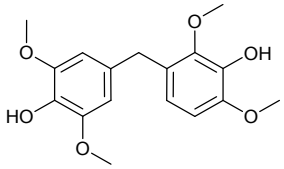
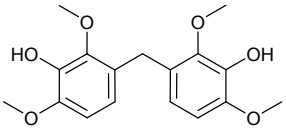
Table S3: Bisphenols with respective binding affinities calculated using AutoDock Vina software, and octanol/water partition coefficients (LogP values) generated using a web-based resource: chemicalize.org by ChemAxon 2020.[4, 5] [Further information about the LogP calculations is provided in the Experimental section of the main text].

a) Bisphenols and their isomers with an unsubstituted bridging carbon

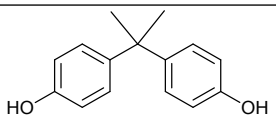
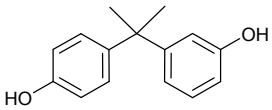
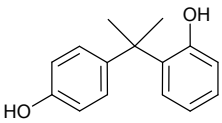
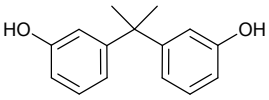
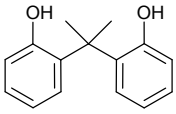
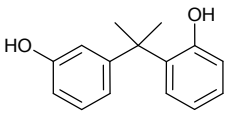
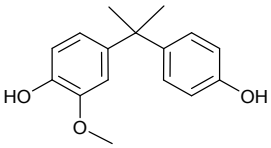
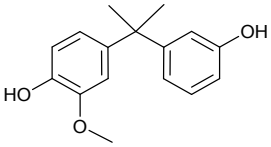
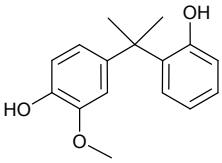
Compound	Structure	Substituents on the bridging carbon	Total number of methoxy groups on the rings	Binding affinity (kcal/mol)	LogP
p,p′-BP(0,0)(Un) [*p,p′*-BPF]		Unsubstituted	0	-7.7	3.4
m,p′-BP(0,0)(Un)		Unsubstituted	0	-7.9	3.4
o,p′-BP(0,0)(Un)		Unsubstituted	0	-7.9	3.4
m,m′-BP(0,0)(Un)		Unsubstituted	0	-7.8	3.4
o,o′-BP(0,0)(Un)		Unsubstituted	0	-7.8	3.4
o,m′-BP(0,0)(Un)		Unsubstituted	0	-7.7	3.4
p,p′-BP(0,1)(Un)		Unsubstituted	1	-7.9	3.3

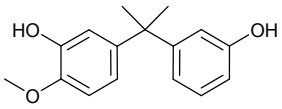
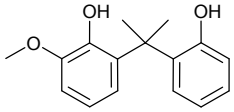
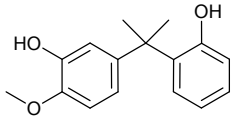
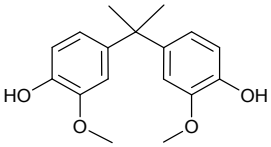
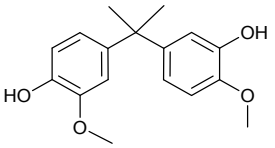
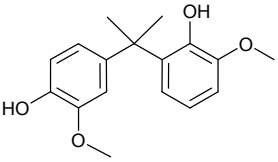
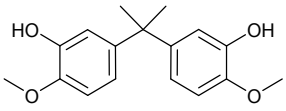
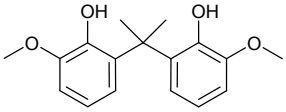
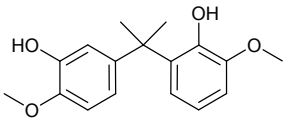
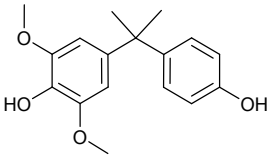
m,p'-BP(0,1)(Un)		Unsubstituted	1	-7.7	3.3
o,p'-BP(0,1)(Un)		Unsubstituted	1	-7.8	3.3
m,m'-BP(0,1)(Un)		Unsubstituted	1	-7.9	3.3
o,o'-BP(0,1)(Un)		Unsubstituted	1	-7.6	3.3
o,m'-BP(0,1)(Un)		Unsubstituted	1	-7.6	3.3
p,p'-BP(1,1)(Un)		Unsubstituted	2	-8.0	3.1
m,p'-BP(1,1)(Un)		Unsubstituted	2	-7.1	3.1
o,p'-BP(1,1)(Un)		Unsubstituted	2	-8.0	3.1
m,m'-BP(1,1)(Un)		Unsubstituted	2	-7.3	3.1
o,o'-BP(1,1)(Un)		Unsubstituted	2	-7.4	3.1
o,m'-BP(1,1)(Un)		Unsubstituted	2	-8.0	3.1

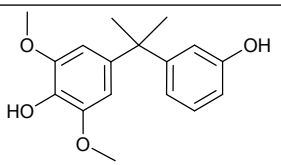
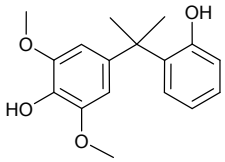
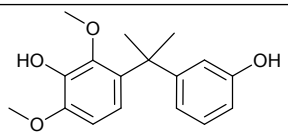
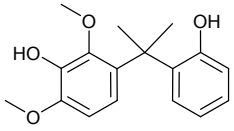
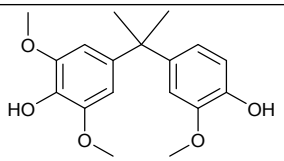
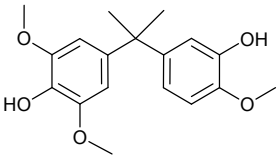
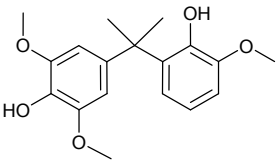
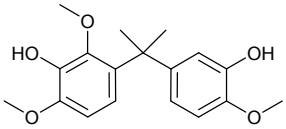
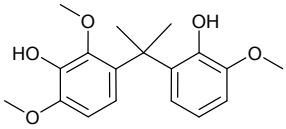
p,p'-BP(0,2)(Un)		Unsubstituted	2	-7.1	3.1
m,p'-BP(0,2)(Un)		Unsubstituted	2	-7.3	3.1
o,p'-BP(0,2)(Un)		Unsubstituted	2	-7.5	3.1
m,m'-BP(0,2)(Un)		Unsubstituted	2	-7.7	3.1
o,m'-BP(0,2)(Un)		Unsubstituted	2	-7.7	3.1
p,p'-BP(1,2)(Un)		Unsubstituted	3	-7.5	2.9
m,p'-BP(1,2)(Un)		Unsubstituted	3	-8.0	2.9
o,p'-BP(1,2)(Un)		Unsubstituted	3	-7.8	2.9
m,m'-BP(1,2)(Un)		Unsubstituted	3	-7.0	2.9
o,m'-BP(1,2)(Un)		Unsubstituted	3	-7.0	2.9

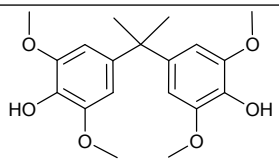
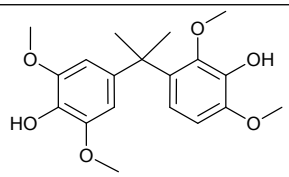
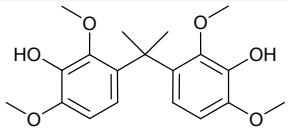
p,p'-BP(2,2)(Un)		Unsubstituted	4	-6.3	2.8
m,p'-BP(2,2)(Un)		Unsubstituted	4	-6.2	2.8
m,m'-BP(2,2)(Un)		Unsubstituted	4	-6.1	2.8

b) Bisphenols and their isomers with a dimethyl-substituted bridging carbon

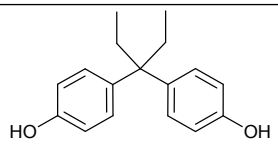
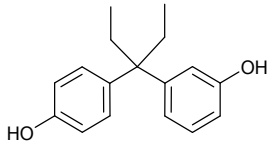
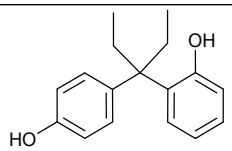
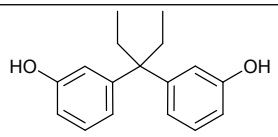
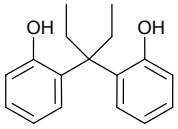
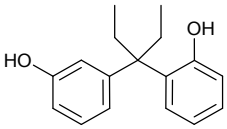
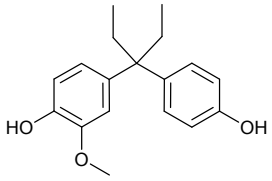
Compound	Structure	Substituents on the bridging carbon	Total number of methoxy groups on the rings	Binding affinity (kcal/mol)	LogP
p,p′-BP(0,0)(Me) [*p,p′*-BPA]		Dimethyl	0	-8.5	4.0
m,p′-BP(0,0)(Me)		Dimethyl	0	-8.6	4.0
o,p′-BP(0,0)(Me)		Dimethyl	0	-8.0	4.0
m,m′-BP(0,0)(Me)		Dimethyl	0	-8.7	4.0
o,o′-BP(0,0)(Me)		Dimethyl	0	-8.3	4.0
o,m′-BP(0,0)(Me)		Dimethyl	0	-8.7	4.0
p,p′-BP(0,1)(Me)		Dimethyl	1	-8.4	3.8
m,p′-BP(0,1)(Me)		Dimethyl	1	-8.2	3.8
o,p′-BP(0,1)(Me)		Dimethyl	1	-8.1	3.8

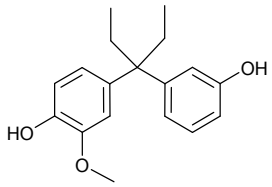
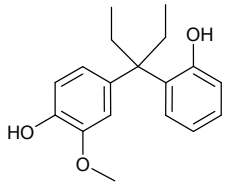
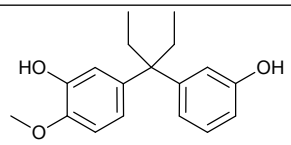
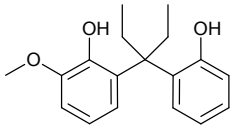
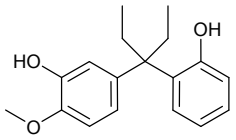
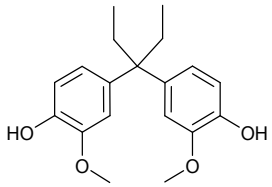
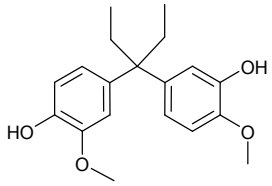
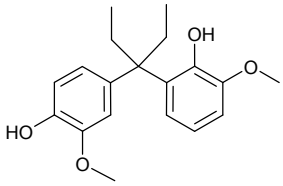
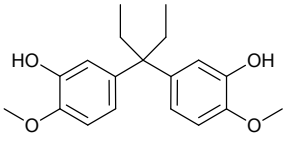
m,m′-BP(0,1)(Me)		Dimethyl	1	-8.1	3.8
o,o′-BP(0,1)(Me)		Dimethyl	1	-8.1	3.8
o,m′-BP(0,1)(Me)		Dimethyl	1	-7.8	3.8
p,p′-BP(1,1)(Me)		Dimethyl	2	-8.6	3.7
m,p′-BP(1,1)(Me)		Dimethyl	2	-8.5	3.7
o,p′-BP(1,1)(Me)		Dimethyl	2	-8.1	3.7
m,m′-BP(1,1)(Me)		Dimethyl	2	-8.2	3.7
o,o′-BP(1,1)(Me)		Dimethyl	2	-7.7	3.7
o,m′-BP(1,1)(Me)		Dimethyl	2	-8.2	3.7
p,p′-BP(0,2)(Me)		Dimethyl	2	-7.6	3.7

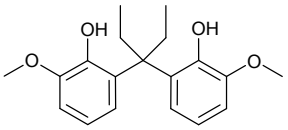
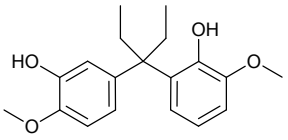
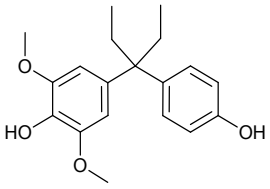
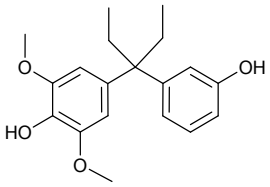
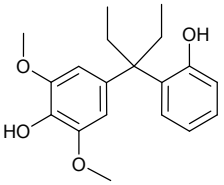
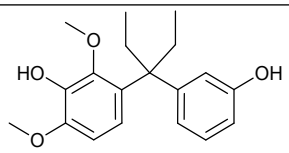
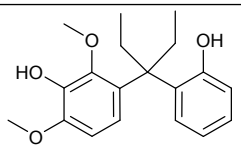
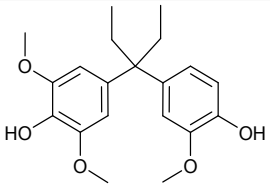
m,p′-BP(0,2)(Me)		Dimethyl	2	-7.7	3.7
o,p′-BP(0,2)(Me)		Dimethyl	2	-7.3	3.7
m,m′-BP(0,2)(Me)		Dimethyl	2	-7.9	3.7
o,m′-BP(0,2)(Me)		Dimethyl	2	-8.0	3.7
p,p′-BP(1,2)(Me)		Dimethyl	3	-6.1	3.7
m,p′-BP(1,2)(Me)		Dimethyl	3	-6.8	3.7
o,p′-BP(1,2)(Me)		Dimethyl	3	-6.6	3.7
m,m′-BP(1,2)(Me)		Dimethyl	3	-6.2	3.7
o,m′-BP(1,2)(Me)		Dimethyl	3	-6.1	3.7

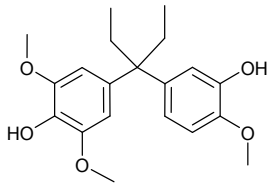
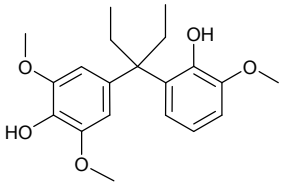
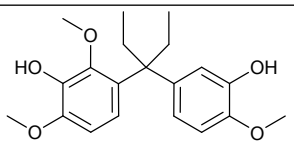
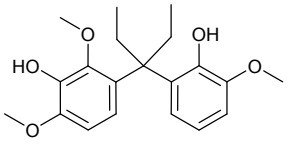
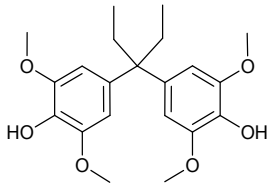
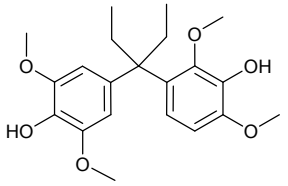
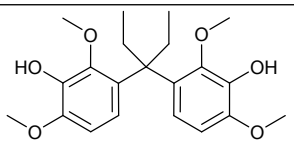
p,p'-BP(2,2)(Me)		Dimethyl	4	-5.9	3.4
m,p'-BP(2,2)(Me)		Dimethyl	4	-5.9	3.4
m,m'-BP(2,2)(Me)		Dimethyl	4	-6.3	3.4

c) Bisphenols and their isomers with a diethyl-substituted bridging carbon

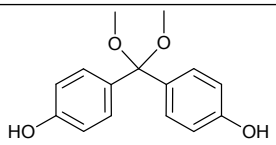
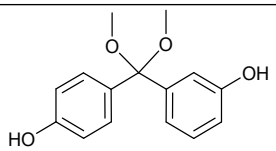
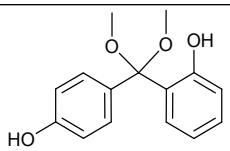
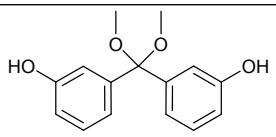
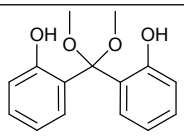
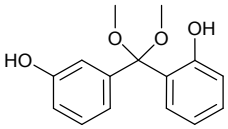
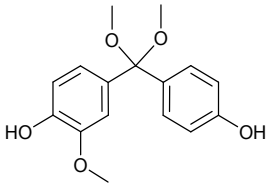
Compound	Structure	Substituents on the bridging carbon	Total number of methoxy groups on the rings	Binding affinity (kcal/mol)	LogP
p,p′-BP(0,0)(Et)		Diethyl	0	-8.3	4.9
m,p′-BP(0,0)(Et)		Diethyl	0	-8.5	4.9
o,p′-BP(0,0)(Et)		Diethyl	0	-8.0	4.9
m,m′-BP(0,0)(Et)		Diethyl	0	-8.6	4.9
o,o′-BP(0,0)(Et)		Diethyl	0	-8.0	4.9
o,m′-BP(0,0)(Et)		Diethyl	0	-8.6	4.9
p,p′-BP(0,1)(Et)		Diethyl	1	-8.1	4.7

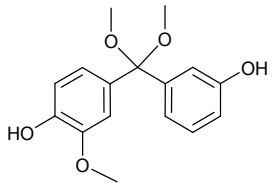
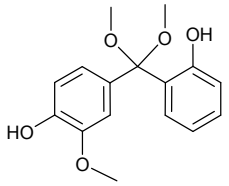
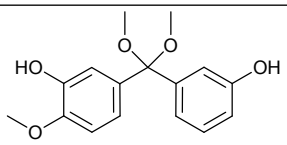
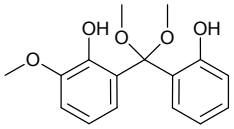
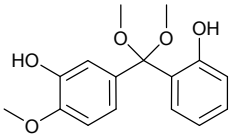
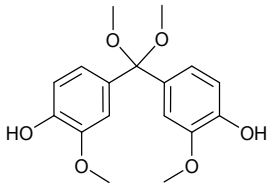
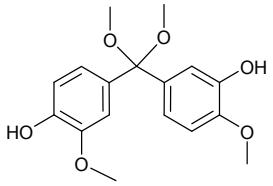
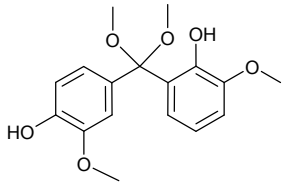
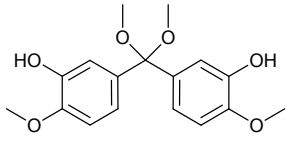
m,p′-BP(0,1)(Et)		Diethyl	1	-8.3	4.7
o,p′-BP(0,1)(Et)		Diethyl	1	-8.1	4.7
m,m′-BP(0,1)(Et)		Diethyl	1	-8.4	4.7
o,o′-BP(0,1)(Et)		Diethyl	1	-8.0	4.7
o,m′-BP(0,1)(Et)		Diethyl	1	-7.9	4.7
p,p′-BP(1,1)(Et)		Diethyl	2	-7.7	4.6
m,p′-BP(1,1)(Et)		Diethyl	2	-8.6	4.6
o,p′-BP(1,1)(Et)		Diethyl	2	-8.1	4.6
m,m′-BP(1,1)(Et)		Diethyl	2	-7.3	4.6

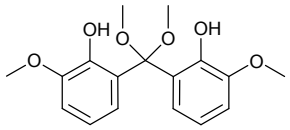
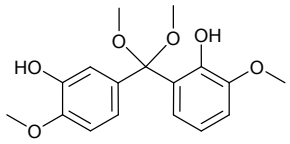
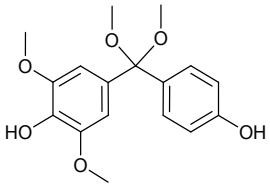
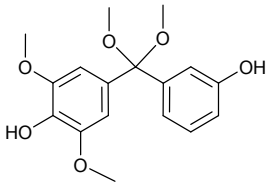
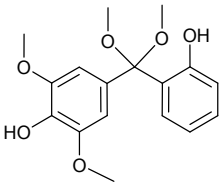
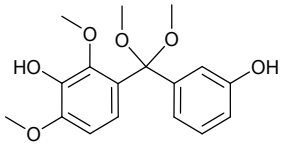
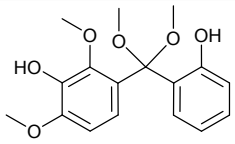
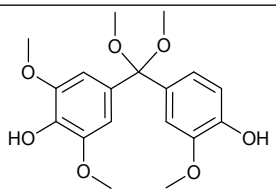
o,o′-BP(1,1)(Et)		Diethyl	2	-7.2	4.6
o,m′-BP(1,1)(Et)		Diethyl	2	-6.9	4.6
p,p′-BP(0,2)(Et)		Diethyl	2	-5.9	4.6
m,p′-BP(0,2)(Et)		Diethyl	2	-6.3	4.6
o,p′-BP(0,2)(Et)		Diethyl	2	-6.1	4.6
m,m′-BP(0,2)(Et)		Diethyl	2	-5.9	4.6
o,m′-BP(0,2)(Et)		Diethyl	2	-6.0	4.6
p,p′-BP(1,2)(Et)		Diethyl	3	-5.4	4.4

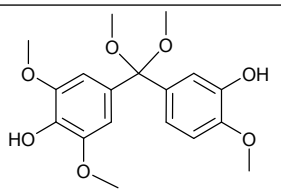
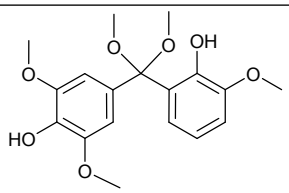
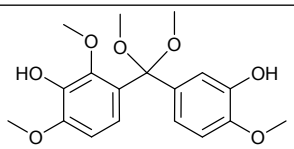
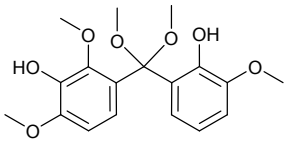
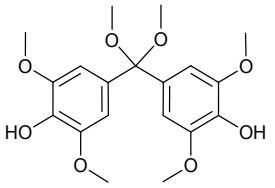
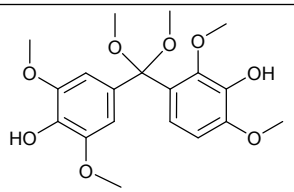
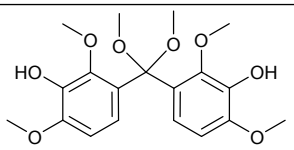
m,p′-BP(1,2)(Et)		Diethyl	3	-6.2	4.4
o,p′-BP(1,2)(Et)		Diethyl	3	-5.9	4.4
m,m′-BP(1,2)(Et)		Diethyl	3	-6.2	4.4
o,m′-BP(1,2)(Et)		Diethyl	3	-5.4	4.4
p,p′-BP(2,2)(Et)		Diethyl	4	-5.4	4.3
m,p′-BP(2,2)(Et)		Diethyl	4	-5.3	4.3
m,m′-BP(2,2)(Et)		Diethyl	4	-5.8	4.3

d) Bisphenols and their isomers with a dimethoxy-substituted bridging carbon

Compound	Structure	Substituents on the bridging carbon	Total number of methoxy groups on the rings	Binding affinity (kcal/mol)	LogP
p,p′-BP(0,0)(MeO)		Dimethoxy	0	-7.6	3.4
m,p′-BP(0,0)(MeO)		Dimethoxy	0	-7.9	3.4
o,p′-BP(0,0)(MeO)		Dimethoxy	0	-7.6	3.4
m,m′-BP(0,0)(MeO)		Dimethoxy	0	-7.9	3.4
o,o′-BP(0,0)(MeO)		Dimethoxy	0	-7.5	3.4
o,m′-BP(0,0)(MeO)		Dimethoxy	0	-7.7	3.4
p,p′-BP(0,1)(MeO)		Dimethoxy	1	-7.7	3.3

m,p′-BP(0,1)(MeO)		Dimethoxy	1	-8.0	3.3
o,p′-BP(0,1)(MeO)		Dimethoxy	1	-7.7	3.3
m,m′-BP(0,1)(MeO)		Dimethoxy	1	-7.7	3.3
o,o′-BP(0,1)(MeO)		Dimethoxy	1	-7.0	3.3
o,m′-BP(0,1)(MeO)		Dimethoxy	1	-7.5	3.3
p,p′-BP(1,1)(MeO)		Dimethoxy	2	-7.5	3.1
m,p′-BP(1,1)(MeO)		Dimethoxy	2	-7.9	3.1
o,p′-BP(1,1)(MeO)		Dimethoxy	2	-7.5	3.1
m,m′-BP(1,1)(MeO)		Dimethoxy	2	-7.8	3.1

o,o′-BP(1,1)(MeO)		Dimethoxy	2	-7.3	3.1
o,m′-BP(1,1)(MeO)		Dimethoxy	2	-7.8	3.1
p,p′-BP(0,2)(MeO)		Dimethoxy	2	-5.7	3.1
m,p′-BP(0,2)(MeO)		Dimethoxy	2	-6.1	3.1
o,p′-BP(0,2)(MeO)		Dimethoxy	2	-5.8	3.1
m,m′-BP(0,2)(MeO)		Dimethoxy	2	-6.4	3.1
o,m′-BP(0,2)(MeO)		Dimethoxy	2	-5.7	3.1
p,p′-BP(1,2)(MeO)		Dimethoxy	3	-5.6	3.0

m,p′-BP(1,2)(MeO)		Dimethoxy	3	-6.0	3.0
o,p′-BP(1,2)(MeO)		Dimethoxy	3	-5.8	3.0
m,m′-BP(1,2)(MeO)		Dimethoxy	3	-6.5	3.0
o,m′-BP(1,2)(MeO)		Dimethoxy	3	-5.6	3.0
p,p′-BP(2,2)(MeO)		Dimethoxy	4	-5.3	2.8
m,p′-BP(2,2)(MeO)		Dimethoxy	4	-5.3	2.8
m,m′-BP(2,2)(MeO)		Dimethoxy	4	-5.7	2.8

LogP estimations

LogP values for bisphenolic compounds were generated using a web-based resource: chemicalize.org by ChemAxon 2020.[4, 5]

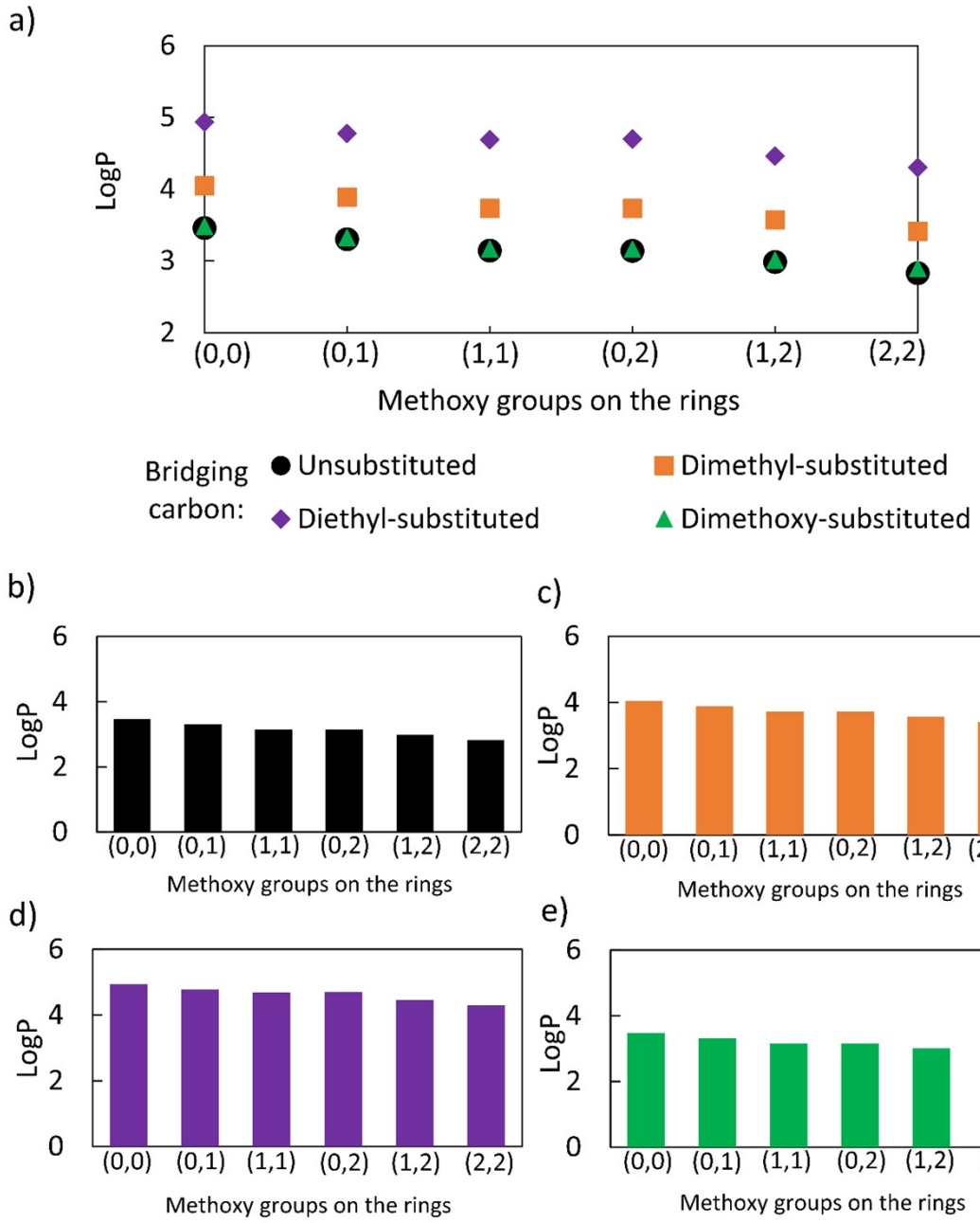


Figure S1: a) LogP values of bisphenols as a function of methoxy-group content from 0 to 4: b) unsubstituted bridging carbon, c) dimethyl-substituted bridging carbon, d) diethyl-substituted bridging carbon, and e) dimethoxy-substituted bridging carbon.

Abbreviations

ARG: Arginine

BP: Bisphenol

BPA: Bisphenol A

BPF: Bisphenol F

EA: Estrogenic activity

EC_{50}: Median effective concentration

Et: Diethyl-substituted

E2: 17β-estradiol

GLU: Glutamic acid

LogP: Octanol/water partition coefficient

Me: Dimethyl-substituted

MeO: Dimethoxy-substituted

MET: Methionine

TYR: Tyrosine

Un: Unsubstituted

References

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4. M. Swain, *Journal of Chemical Information and Modeling*, 2012, **52**, 613-615.
5. ChemAxon 2020, Software solutions and services for chemistry and biology, https://chemaxon.com/, (accessed June 3, 2021).