Data from Article:

A Unified View to Brønsted Acidity Scales: Do we need Solvated Protons?

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Table 2. Acidity scale in 1,2-dichloroethane; see the text for in-depth explanations of the data.

No	Acid	$pK_{ip,rel}$	$pK_{a,rel}$	$pK_{a,DCE}$	$pH_{abs}^{H_2O}$ (BP)[a]	Directly measured ΔpK_{ip} values in DCE
1	9-COOMe-fluorene	13.2	13.1	58.1	15.4	0.24
2	(4-Me-C_6F_4)$_2$CHCN	12.9	12.8	57.8	15.1	1.38
3	(4-Me-C_6F_4)(C_6F_5)CHCN	11.9	11.7	56.7	14.0	1.03
4	9-CN-fluorene	11.0	10.9	55.9	13.2	1.95
5	(4-H-C_6F_4)(C_6F_5)CHCN	10.8	10.7	55.7	13.0	1.03
6	(4-Cl-C_6F_4)(C_6F_5)CHCN	9.9	9.7	54.7	12.0	0.99
7	(2-$C_{10}F_7$)(C_6F_5)CHCN	9.5	9.4	54.4	11.7	0.20
8	9-C_6F_5-octafluorofluorene	9.0	8.8	53.8	11.1	1.12
9	(2-$C_{10}F_7$)$_2$CHCN	8.6	8.4	53.4	10.7	1.22
10	(4-CF_3-C_6F_4)(C_6F_5)CHCN	7.5	7.3	52.3	9.6	0.42
11	(C_6F_5)CH(CN)COOEt	7.5	7.5	52.5	9.8	0.55
12	(4-Cl-C_6F_4)CH(CN)COOEt	7.3	7.2	52.2	9.5	1.29
13	(2-$C_{10}F_7$)CH(CN)COOEt	7.1	7.0	52.0	9.3	0.93
14	(4-CF_3-C_6F_4)CH(CN)COOEt	5.7	5.6	50.6	7.9	0.37
15	(4-NC_5F_4)(C_6F_5)CHCN	5.7	5.5	50.5	7.8	1.54
16	(4-NC_5F_4)CH(CN)COOEt	4.4	4.4	49.4	6.7	1.13
17	3-CF_3-C_6H_4CH(CN)$_2$	4.0	4.0	49.0	6.3	1.03
18	(CF_3)$_5$$C_6$CH(CN)COOEt	3.0	2.8	47.8	5.1	0.04
19	4-H-C_6F_4CH(CN)$_2$	2.5	2.5	47.5	4.8	0.22
20	(4-NC_5F_4)$_2$CHCN	2.4	2.3	47.3	4.6	0.38
21	2-$C_{10}F_7$CH(CN)$_2$	1.4	1.3	46.3	3.6	0.30
22	Bromothymol blue	1.4	1.1	46.1	3.4	0.22
23	Bromocresol green	0.5	0.2	45.2	2.5	1.47
24	Picric acid[b]	0.0	0.0	45.0	2.3	1.62
25	HCl	-0.4	0.2	45.2	2.5	0.03
26	2,3,4,6-(CF_3)$_4$-C_6HCH(CN)$_2$	-0.7	-0.8	44.2	1.5	1.46
27	4-CF_3-C_6F_4CH(CN)$_2$	-0.8	-0.8	44.2	1.5	1.24
28	Styphnic acid	-0.9	-0.9	44.1	1.4	1.75
29	4-NO_2-$C_6H_4SO_2NHTos$[c]	-1.5	-1.7	43.3	0.6	0.37
30	HNO_3	-1.7	-1.4	43.6	0.9	1.40
31	4-NO_2-$C_6H_4SO_2NHSO_2C_6H_4$-4-Cl	-2.4	-2.6	42.4	-0.3	1.00
32	H_2SO_4	-2.5	-2.2	42.8	0.1	0.62
33	$C_6(CF_3)_5CH(CN)_2$	-2.6	-2.8	42.2	-0.5	1.55
34	(4-NO_2-C_6H_4-SO_2)$_2$NH	-3.7	-3.9	41.1	-1.6	0.56
35	3-NO_2-4-Cl-$C_6H_3SO_2NHSO_2C_6H_4$-4-NO_2	-4.1	-4.3	40.7	-2.0	0.01
36	(3-NO_2-4-Cl-$C_6H_3SO_2$)$_2$NH	-4.5	-4.6	40.4	-2.3	0.11
37	HBr	-4.9	-4.4	40.6	-2.1	0.97
38	4-NO_2-$C_6H_4SO_2CH(CN)_2$	-5.1	-5.1	39.9	-2.8	1.02
39	2,4,6-(SO_2F)$_3$-Phenol	-5.9	-6.0	39.0	-3.7	1.07
40	2,4,6-Tf_3-Phenol[d]	-6.4	-6.6	38.4	-4.3	0.06
						1.00
						1.47
						1.35
						0.69
						1.25
						0.73
						1.32
						0.71
						0.73
						0.90
						1.48
						0.36
						1.09
						2.08
						1.78
						0.09
						0.04
						0.77
						0.74
						1.00
						0.28
						1.01
						1.13
						0.88
						0.08
						0.24
						0.12
						1.26
						1.02
						1.02
						1.05
						1.48
						0.47
						0.80
						0.36
						1.35
						0.39
						0.93
						0.62
						0.19
						1.03
						0.80
						1.33
						0.64

No	Acid	$pK_{ip,rel}$	$pK_{a,rel}$	$pK_{a,DCE}$	$pH_{abs}^{H_2O}$ (BP)[a]	Directly measured ΔpK_{ip} values in DCE
41	$CH(CN)_3$	-6.5	-6.4	38.6	-4.1	
42	4-Cl-$C_6H_4SO(=NTf)NHTos$	-6.8	-7.0	38.0	-4.7	
43	NH_2-TCNP[e]	-6.8	-6.8	38.2	-4.5	
44	2,3,5-tricyanocyclopentadiene	-7.0	-7.0	38.0	-4.7	
45	Pentacyanophenol	-7.6	-7.5	37.5	-5.2	
46	4-Cl-$C_6H_4SO(=NTf)NHSO_2C_6H_4$-4-Cl	-7.6	-7.9	37.1	-5.6	
47	HI	-7.7	-7.3	37.7	-5.0	
48	4-NO_2-$C_6H_4SO_2NHTf$	-7.8	-7.9	37.1	-5.6	
49	Me-TCNP	-8.6	-8.6	36.4	-6.3	
50	3,4-$(MeO)_2$-C_6H_3-TCNP	-8.7	-8.9	36.1	-6.6	
51	4-MeO-C_6H_4-TCNP	-8.7	-8.9	36.1	-6.6	
52	$C(CN)_2=C(CN)OH$	-8.8	-8.7	36.3	-6.4	
53	4-Cl-$C_6H_4SO(=NTf)NHSO_2C_6H_4$-$NO_2$	-8.8	-9.1	35.9	-6.8	
54	2,4-$(NO_2)_2$-$C_6H_3SO_2OH$	-8.9	-9.0	36.0	-6.7	
55	$C_6F_5CH(Tf)_2$	-9.0	-9.1	35.9	-6.8	
56	$HB(CN)(CF_3)_3$	-9.3	-9.3	35.7	-7.0	
57	Ph-TCNP	-9.4	-9.5	35.5	-7.2	
58	HBF_4	-10.3	-10.0	35.0	-7.7	
59	FSO_2OH	-10.5	-10.3	34.7	-8.0	
60	3-CF_3-C_6H_4-TCNP	-10.5	-10.7	34.3	-8.4	
61	H-TCNP	-10.7	-10.7	34.3	-8.4	
62	$[C_6H_5SO(=NTf)]_2NH$	-11.1	-11.4	33.6	-9.1	
63	$[(C_2F_5)2PO]_2NH$	-11.3	-11.5	33.5	-9.2	
64	2,4,6-$(NO_2)_3$-$C_6H_2SO_2OH$	-11.3	-11.4	33.6	-9.1	
65	$[C(CN)_2=C(CN)]_2CH_2$	-11.4	-11.5	33.5	-9.2	
66	TfOH	-11.4	-11.3	33.7	-9.0	
67	$C_6H_5SO(=NTf)NHTf$	-11.5	-11.7	33.3	-9.4	
68	$TfCH(CN)_2$	-11.6	-11.5	33.5	-9.2	
69	Br-TCNP	-11.8	-11.8	33.2	-9.5	
70	$[C(CN)_2=C(CN)]_2NH$	-11.8	-12.0	33.0	-9.7	
71	3,5-$(CF_3)_5$-C_6H_3-TCNP	-11.8	-12.0	33.0	-9.7	
72	Tf_2NH[f]	-11.9	-12.0	33.0	-9.7	
73	4-Cl-$C_6H_4SO(=NTf)NHTf$	-12.1	-12.3	32.7	-10.0	
74	Cl-TCNP	-12.1	-12.1	32.9	-9.8	
75	$(C_3F_7SO_2)_2NH$	-12.1	-12.3	32.7	-10.0	
76	$(C_4F_9SO_2)_2NH$	-12.2	-12.4	32.6	-10.1	
77	CN-CH_2-TCNP	-12.3	-12.4	32.6	-10.1	
78	$(C_2F_5SO_2)_2NH$	-12.3	-12.4	32.6	-10.1	
79	CF_3-TCNP	-12.7	-12.8	32.2	-10.5	
80	$HClO_4$	-13.0	-12.8	32.2	-10.5	
81	$CF_2(CF_2SO_2)_2NH$	-13.1	-13.1	31.9	-10.8	
82	4-NO_2-$C_6H_4SO(=NTf)NHTf$	-13.1	-13.3	31.7	-11.0	
83	$HB(CN)_4$	-13.3	-13.3	31.7	-11.0	
84	$(FSO_2)_3CH$	-13.6	-13.6	31.4	-11.3	
85	$Tf_2CH(CN)$	-14.9	-15.0	30.0	-12.7	
86	2,3,4,5-tetracyanocyclopentadiene	-15.1	-15.1	29.9	-12.8	
87	CN-TCNP	-15.3	-15.3	29.7	-13.0	

[a] Estimates of absolute acidities in terms of aqueous pH of 1:1 HA/A^- buffer solution in DCE of the respective acid. [b] $pK_{ip,rel}$ value of picric acid is arbitrarily set to 0. [c] Tos represents the 4-Me-$C_6H_4SO_2$-group. [d] Tf represents the CF_3SO_2-group. [e] X-TCNP represents 2-X-1,1,3,3-tetracyanopropene. [f] Reference acid for the $pK_{a,DCE}$ values with computational $pK_{a,DCE}$ value 33.