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On the Acidity and Reactivity of Highly Effective Chiral Brønsted Acid Catalysts - Establishment of an Acidity Scale**

Karl Kaupmees,[a] Nikita Tolstoluzhsky,[b] Sadiya Raja,[b] Magnus Rueping[b,] and Ivo Leito[a,]**

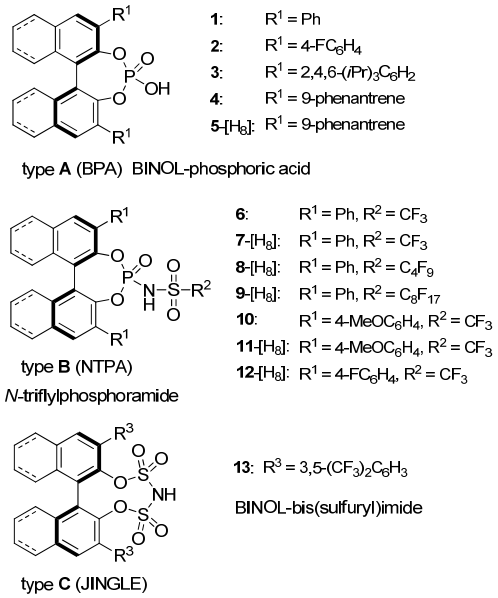

Figure 1. Types of chiral Brønsted acid organocatalysts. [H_8] denotes 5,6,7,8-tetrahydronaphthyl rings.

Table 1. Results of the pK_a measurements in AN presented in the order of decreasing acidity.

Compound[a]; Substituents	Assigned pK_a[b]	-log(k_l) LLS[c]	NLS[d]
5-[H_8]; R^1 = 9-phenatrene	14.0	5.55	5.55
3; R^1 = 2,4,6-(iPr)$_3$-C_6H_2	13.6		
4; R^1 = 9-phenatrene	13.3		
1; R^1 = Ph	12.7	5.35	5.36
2; R^1 = 4-F-C_6H_4	12.5		
11-[H_8]; R^1 = 4-MeO-C_6H_4; R^2 = CF_3	6.9		
9-[H_8]; R^1 = Ph; R^2 = C_8F_{17}	6.8	3.73	3.72
7-[H_8]; R^1 = Ph; R^2 = CF_3	6.7		
8-[H_8]; R^1 = Ph; R^2 = C_4F_9	6.7	3.60	3.60
10; R^1 = 4-MeO-C_6H_4; R^2 = CF_3	6.4	3.33	3.32
6; R^1 = Ph; R^2 = CF_3	6.4		
12-[H_8]; R^1 = 4-F-C_6H_4; R^2 = CF_3	6.3		
13; R^3 = 3,5-$(CF_3)_2$-C_6H_3	5.2	2.85	2.89

[a] References describing synthesis are given in Supporting Information; [b] pK_a scale in AN anchored to Picric acid pK_a=11.0; [c] LLS - linearized least squares method; [d] NLS - nonlinear least squares method.

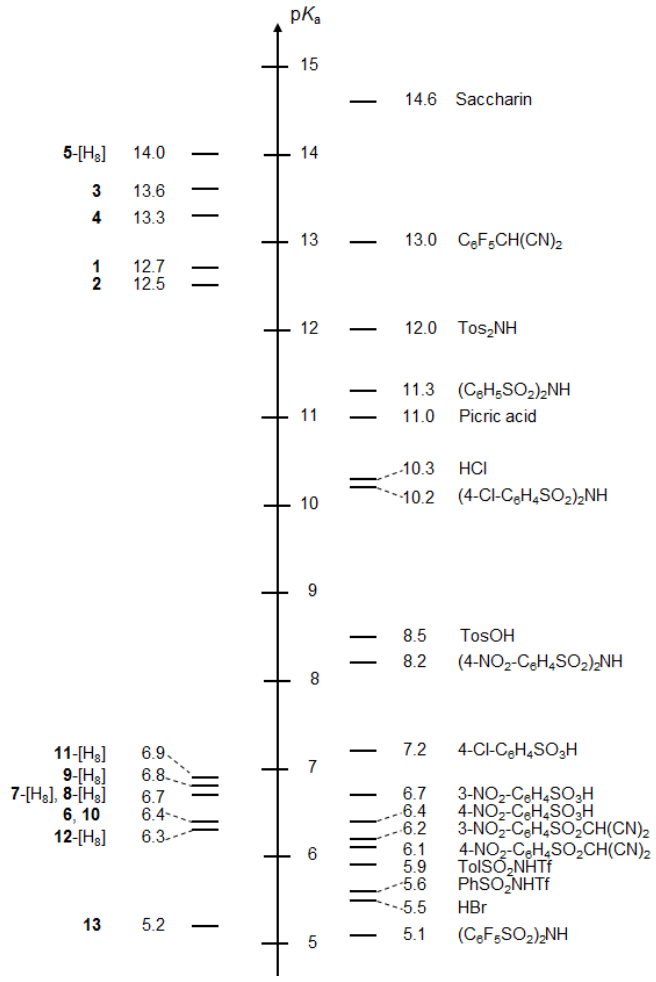

Figure 2. Comparison of pK_a data[1,2]. Tos denotes 4-Me-C_6H_4-SO_2-

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