doi:10.1351/goldbook.B00746

Brønsted relation

Also contains definition of: catalysis law

The term applies to either of the equations:

$$\frac{k_{\mathrm{HA}}}{p} = G\left(\frac{q\,K_{\mathrm{HA}}}{p}\right)^{\alpha}$$

$$\frac{k_{\mathrm{A}}}{q} = G\left(\frac{q\,K_{\mathrm{HA}}}{p}\right)^{-\beta}$$

(or their logarithmic forms) where α, β and G are constants for a given reaction series (α and β are called 'Brønsted exponents'), k_{HA} and k_{A} are catalytic coefficients (or rate coefficients) of reactions whose rates depend on the concentrations of HA and/or of A^- . K_{HA} is the acid dissociation constant of the acid HA, p is the number of equivalent acidic protons in the acid HA, and q is the number of equivalent basic sites in its conjugate base A^-. The chosen values of p and q should always be specified. (The charge designations of H and A are only illustrative.) The Brønsted relation is often termed the 'Brønsted catalysis law' (or the 'Catalysis Law'). Although justifiable on historical grounds, this name is not recommended, since Brønsted relations are known to apply to many uncatalysed and pseudo-catalysed reactions (such as simple proton (hydron) transfer reactions). The term 'pseudo-Brønsted relation' is sometimes used for reactions which involve nucleophilic catalysis instead of acid–base catalysis. Various types of Brønsted parameters have been proposed such as β_{lg}, β_{nuc}, β_{eq} for leaving group, nucleophile and equilibrium constants, respectively.
See also: linear free–energy relation

Source:
PAC, 1994, *66*, 1077 *(Glossary of terms used in physical organic chemistry (IUPAC Recommendations 1994))* on page 1091
PAC, 1996, *68*, 149 *(A glossary of terms used in chemical kinetics, including reaction dynamics (IUPAC Recommendations 1996))* on page 154

