partial rate factor

The rate of substitution at one specific site in an *aromatic* compound relative to the rate of substitution at one position in benzene. For example, the partial rate factor f_p^Z for *para*-substitution in a monosubstituted benzene C_6H_5Z is related to the rate constants $k(C_6H_5Z)$ and $k(C_6H_6)$ for the total reaction (i.e. at all positions) of C_6H_5Z and benzene, respectively, and % *para* (the percentage *para*-substitution in the total product formed from C_6H_5Z) by the relation:

$$f_p^Z = \frac{6k\,(C_6H_5Z)}{k\,(C_6H_6)} \frac{\%\ para}{100}$$

Similarly for *meta*-substitution:

$$f_m^Z = \frac{6k\,(C_6H_5Z)}{2k\,(C_6H_6)} \frac{\%\ meta}{100}$$

(The symbols p_f^Z, m_f^Z, o_f^Z are also in use.) The term applies equally to the *ipso* position, and it can be extended to other substituted substrates undergoing parallel reactions at different sites with the same reagent according to the same *rate law*.

See also *selectivity*.

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