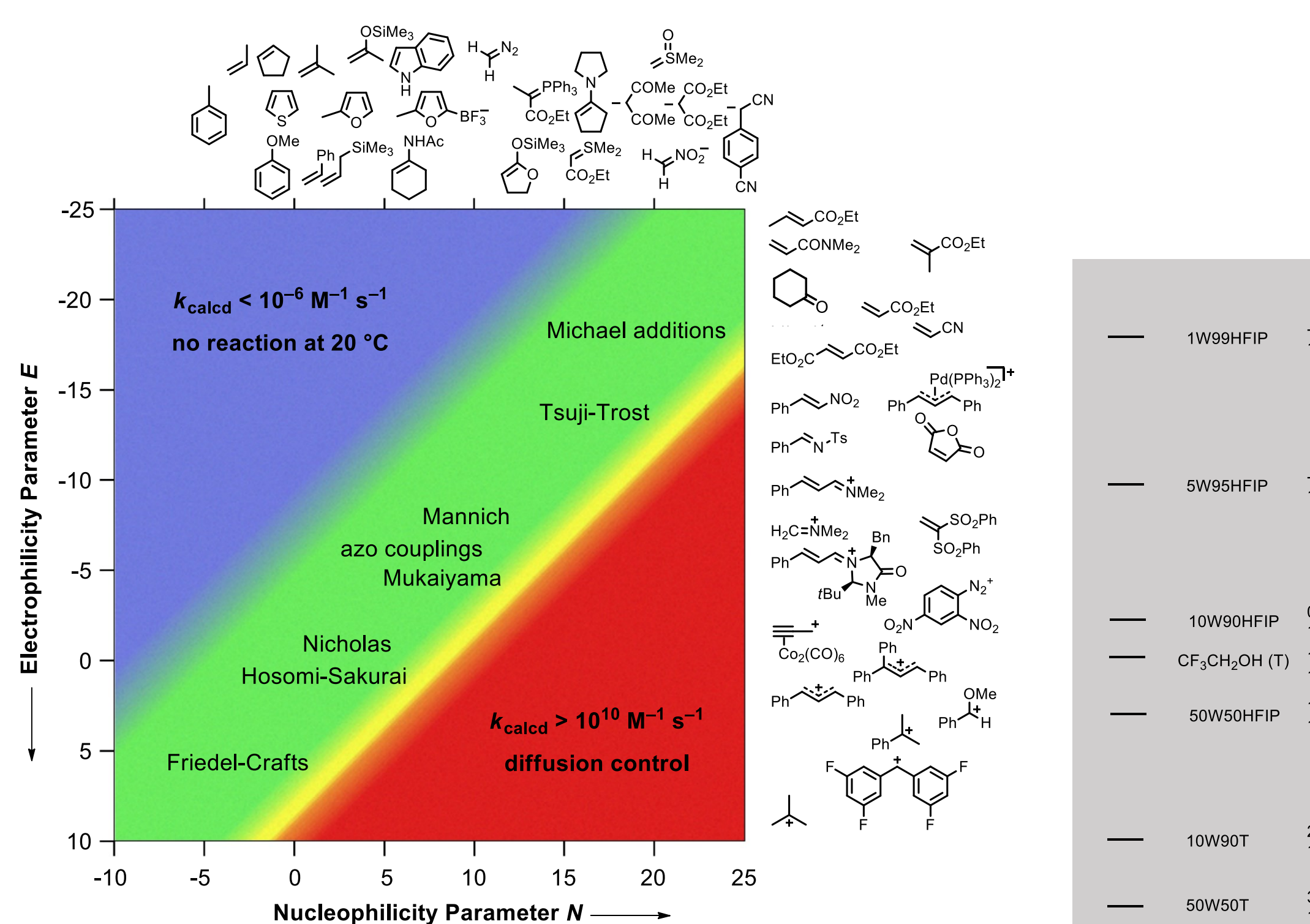


# Reactivity Scales

v2023/08



The reactivity poster shows a selection of the published reactivity parameters  $E$ ,  $N$ , and  $s_N$ , which allow the calculation of the rate constants for combination reactions of electrophiles with nucleophiles, with the following equation:

$$\lg k_{20^\circ\text{C}} = s_N(N + E)$$

$E$  = electrophilicity parameter

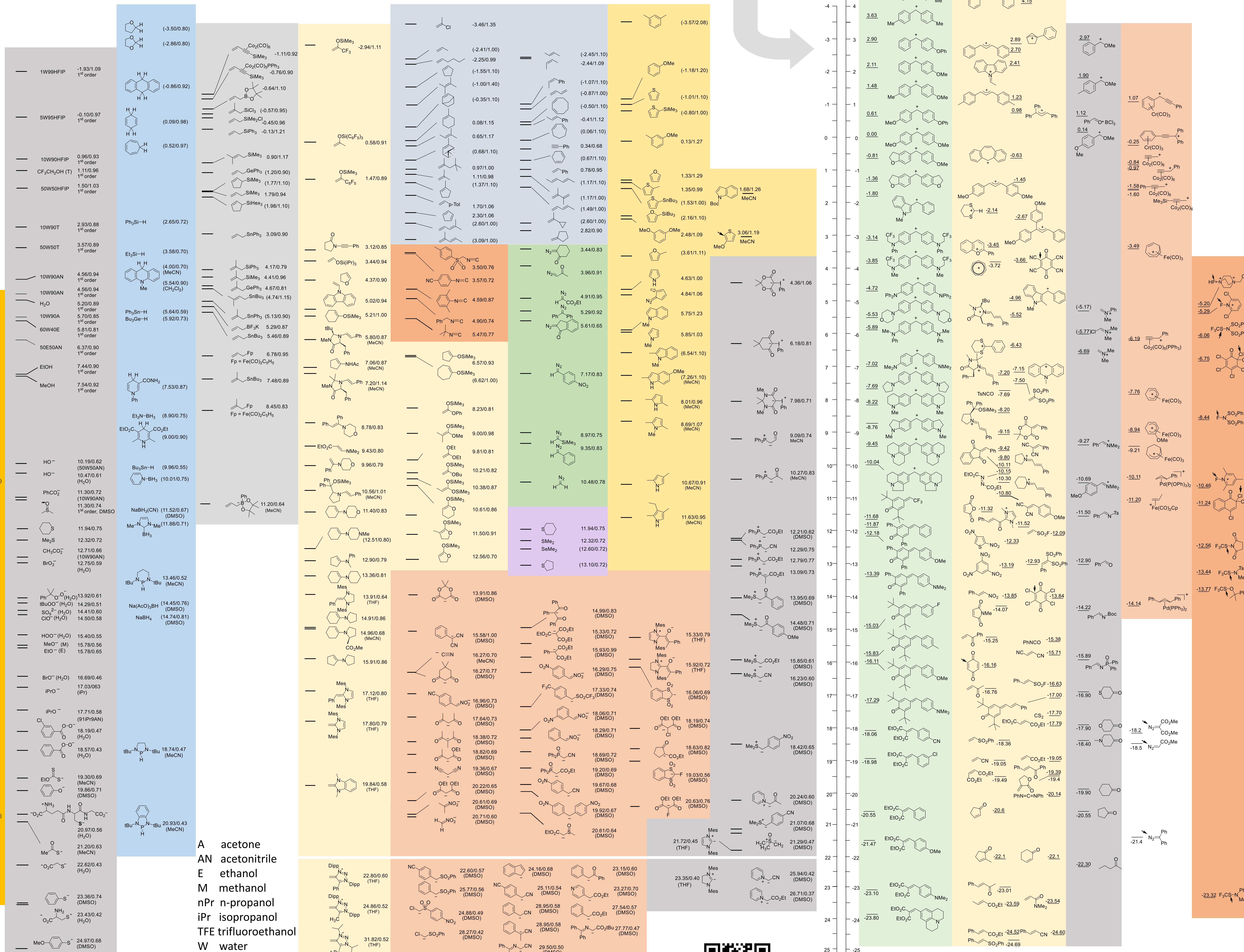
$N$  = nucleophilicity parameter

$s_N$  = nucleophile-specific sensitivity parameter

( $N$  and  $s_N$  are solvent-dependent; solvent is  $\text{CH}_2\text{Cl}_2$  if not mentioned otherwise)

How to read the scales:

- Nucleophiles and electrophiles located on the same level ( $E + N = 0$ ) combine with rate constants of  $k \approx 1 \text{ M}^{-1} \text{ s}^{-1}$  at  $20^\circ\text{C}$ , corresponding to half-reaction times of 10 seconds for 0.1 M solutions.
- At  $20^\circ\text{C}$  electrophiles will generally not react with nucleophiles positioned more than 5 units higher.
- Electrophiles will generally undergo diffusion controlled (often unselective) reactions with nucleophiles positioned more than 9 units lower.



Nucleophiles

Further reactivity parameters are accessible at:

[www.cup.lmu.de/oc/mayr/DBintro.html](http://www.cup.lmu.de/oc/mayr/DBintro.html)



Electrophiles

Get your free pdf of Mayr's Reactivity Scales Poster at:  
[www.cup.lmu.de/oc/mayr/MayrPoster.html](http://www.cup.lmu.de/oc/mayr/MayrPoster.html)