catalytic coefficient

If the rate of reaction, \( v \), is expressible in the form:

\[
v = (k_0 + \sum_i k_i [C_i]^{n_i}) [A]^\alpha [B]^\beta ...
\]

where A, B, ... are reactants and \( C_i \) represents one of a set of catalysts, then the proportionality factor \( k_i \) is the catalytic coefficient of the particular catalyst \( C_i \). Normally the partial order of reaction \( n_i \) with respect to a catalyst is unity, so that \( k_i \) is an \((\alpha + \beta + ... + 1)\)th order rate coefficient. The proportionality factor \( k_0 \) is the \((\alpha + \beta + ...)\)th order rate coefficient of the uncatalysed component of the total reaction. For example, if there is catalysis by hydrogen and hydroxide ions, and the rate constant can be expressed in the form:

\[
k = k_0 + k_{H^+} [H^+] + k_{OH^-} [OH^-],
\]

then \( k_{H^+} \) and \( k_{OH^-} \) are the catalytic coefficients for \( H^+ \) and \( OH^- \), respectively. The constant \( k_0 \) relates to the uncatalysed reaction.

**Source:**
PAC, 1996, 68, 149 (A glossary of terms used in chemical kinetics, including reaction dynamics (IUPAC Recommendations 1996)) on page 156
PAC, 1994, 66, 1077 (Glossary of terms used in physical organic chemistry (IUPAC Recommendations 1994)) on page 1093