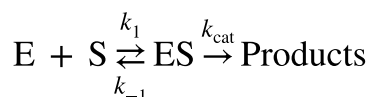


## Michaelis–Menten kinetics

The dependence of an initial rate of reaction upon the concentration of a substrate S that is present in large excess over the concentration of an enzyme or other catalyst (or reagent) E with the appearance of saturation behaviour following the Michaelis–Menten equation:

$$v = \frac{V[S]}{K_m + [S]},$$

where  $v$  is the observed initial rate,  $V$  is its limiting value at substrate saturation (i.e.  $[S] \gg K_m$ ), and  $K_m$  the substrate concentration when  $v = \frac{V}{2}$ . The definition is experimental, i.e. it applies to any reaction that follows an equation of this general form. The symbols  $V_{\max}$  or  $v_{\max}$  are sometimes used for  $V$ . The parameters  $V$  and  $K_m$  (the 'Michaelis constant') of the equation can be evaluated from the slope and intercept of a linear plot of  $v^{-1}$  vs.  $[S]^{-1}$  (a 'Lineweaver–Burk plot') or from slope and intercept of a linear plot of  $v$  vs.  $\frac{v}{[S]}$  ('Eadie–Hofstee plot'). A Michaelis–Menten equation is also applicable to the condition where E is present in large excess, in which case the concentration  $[E]$  appears in the equation instead of  $[S]$ . The term has sometimes been used to describe reactions that proceed according to the scheme:



in which case  $K_m = \frac{k_{-1} + k_{\text{cat}}}{k_1}$  (Briggs–Haldane conditions). It has more usually been applied only to the special case in which  $k_{-1} \gg k_{\text{cat}}$  and  $K_m = \frac{k_{-1}}{k_1} = K_s$ ; in this case  $K_m$  is a true dissociation constant (Michaelis–Menten conditions).

**See also:** rate-determining step

### Source:

PAC, 1994, 66, 1077 (*Glossary of terms used in physical organic chemistry (IUPAC Recommendations 1994)*) on page 1140

PAC, 1996, 68, 149 (*A glossary of terms used in chemical kinetics, including reaction dynamics (IUPAC Recommendations 1996)*) on page 172