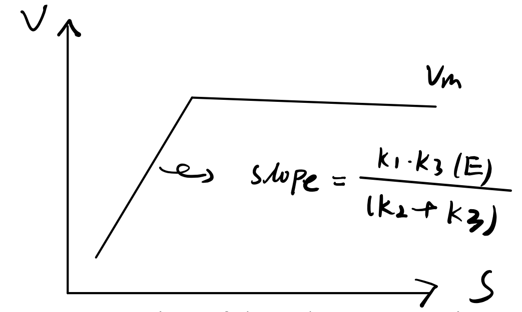
The velocity of the enzymatic reaction, V, can be expressed as the rate of formation of the product P, which is equal to the rate of breakdown of the intermediate species ES. The rate of breakdown of ES is equal to k3*[ES], where [ES] is the concentration of the intermediate species. The concentration of the intermediate species can be expressed in terms of the concentration of the substrate, [S], using the steady state approximation, which assumes that the rate of formation of ES is equal to the rate of breakdown of ES. This gives us:

[ES] = (k1*[E]*[S])/(k2 + k3)

Substituting this expression for [ES] into the expression for the rate of breakdown of ES, we get:

V = k3*[ES] = (k1k3[E]*[S])/(k2 + k3)

Plot :



When the concentration of the substrate, [S], is small, the term (k2 + k3) in the denominator is much larger than k1*[E][S], so the velocity V is approximately equal to **(k1k3*[E][S])/(k2 + k3) = k1[E]*[S]/k2**. In this case, the velocity V increases approximately linearly with [S], as the concentration of S increases.

At large concentrations of S, the term k1*[E]*[S] in the numerator becomes much larger than (k2 + k3) in the denominator, so the velocity V saturates to a maximum value, Vm. This maximum value, Vm, is given by:

Vm = (k1k3[E])/k2

We can also find it on the plot, which is the maximum velocity of the enzymatic reaction.