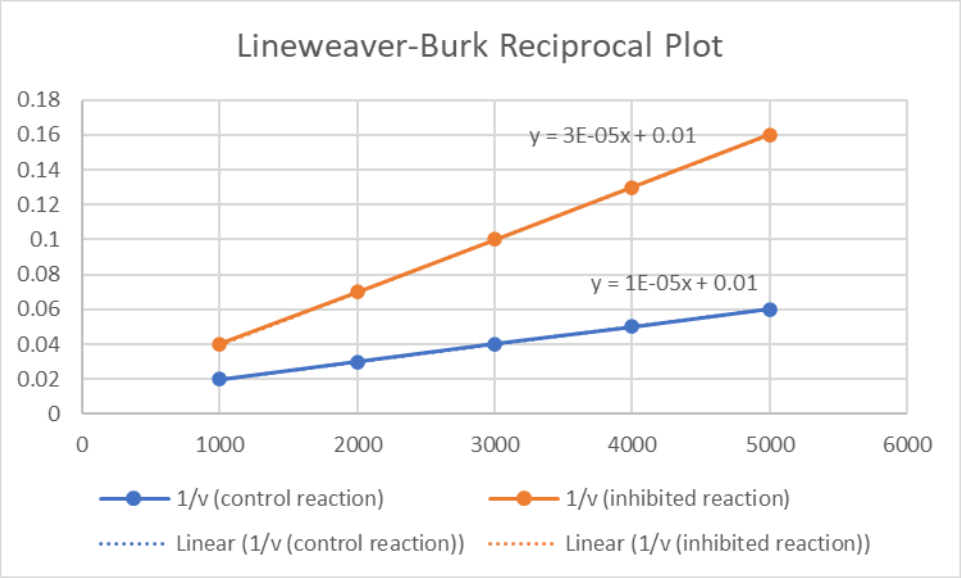
The low [S] limit: this is where the [S]<<Km. If we zoom in at the low [S] limit we get a graph that is first order wrt [S].

The other limit is the high [S] limit where [S]>>Km. If we zoom in at the high [S] limit we get a graph that is zero order wrt [S].



Above is an example of a Lineweaver-Burke reciprocal plot, which is how you linearise the Michaelis-Menten rate laws. For L-B plots, you plot 1/rate against 1/[S] to get a linear graph.

$\frac{1}{v} = \frac{Km}{Vmax}\frac{1}{[S]} + \frac{1}{Vmax}$ where $\frac{1}{v}$ is the y-axis, $\frac{Km}{Vmax}$ is the slope/gradient, $\frac{1}{Vmax}$ is the y-intercept, and $-\frac{1}{Km}$ is the x-intercept.

Problems with the L-B plot are equally spaced increments of [S] do not give equally spaced points on a reciprocal plot meaning points can become clustered and this messes with determining the line of best fit, and small errors in rate are magnified on the reciprocal plot which can give significant error to the slope. The solution to this is to use data that is in the range of the Km value.

The turnover frequency, Kcat, is the number of catalytic cycles (turnovers) or the number of substrate molecules transformed in one-unit time by a single enzyme molecule when the enzyme concentration is rate-limiting.

Catalytic efficiency (η) is the ratio of the turnover frequency to the Michaelis constant. The higher the value the more efficient the enzyme. Catalytic efficiency is determined by the rate at which ES forms (diffusion-controlled limit).

A catalytically perfect enzyme or kinetically perfect enzyme is an enzyme that catalyses so efficiently, that almost every time enzyme meets its substrate, the reaction occurs. The specificity constant, kcat/Km, of such enzymes is on the order of 10^8 to 10^9 dm^3 mol^{-1} s^{-1}, indicating high efficiency.

An enzyme inhibitor is any substance that reduces the rate of an enzyme catalysed reaction. Enzyme inhibition can be reversible or irreversible. There are 3 types of enzyme inhibition: competitive, uncompetitive, and non-competitive.

In competitive inhibition the inhibitor binds to free enzyme molecules thus preventing them from substrate binding. The inhibitor and the substrate are mutually exclusive because of true