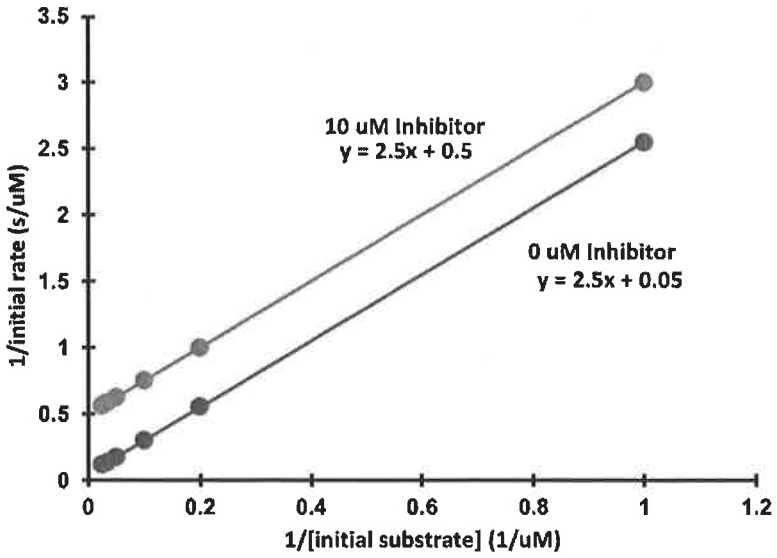
Name: Key Quiz 18

Imagine that you collect the following kinetic data with 11 nM of enzyme present in each assay.



1. Write out the mechanism supported by the presented data. There is no need to include the mathematical expression.

$$I + E + S \rightleftharpoons ES + I \longrightarrow E + P + I$$
$$\downarrow\uparrow$$
$$ESI$$

2. Determine the numerical value of V_{Max}. Include units.

$$V_{max} = \frac{1}{0.05} = 20\ \frac{\mu M}{s}$$

3. Determine the numerical value of K_M. Include units.

$$m = \frac{K_m}{V_{max}}$$

$$K_m = (2.5)(20) = 50\ \mu M$$

4. Determine the numerical value of any K_I parameters. Include units.

$$V_{max}^{app} = \frac{V_{max}}{1 + \frac{[I]}{K_I}} \qquad 1 + \frac{10}{K_I} = 10$$

$$2 = \frac{20}{1 + \frac{10}{K_I}} \qquad \frac{10}{K_I} = 9 \qquad K_I = 1.11\ \mu M$$

5. Determine the numerical value of k_{cat}. Include units.

$$11\ nM \longrightarrow 0.011\ \mu M$$

$$V_{max} = k_{cat}[E]_{total} \qquad k_{cat} = \frac{V_{max}}{[E]_{tot}} = \frac{20\ \frac{\mu M}{s}}{0.011\ \mu M} = 1{,}818\ \frac{1}{s}$$