CONCEPT: MICHAELIS MENTEN ASSUMPTIONS

●Leonor _____ & Maud _____ proposed a fundamental model to explain enzyme kinetics in 1913.

  □ Proposed that it is necessary for an _____-complex to form during an enzyme-catalyzed reaction.

  □ Canadian law did not give women the right to vote & language indicated only a man could be a "person."

  □ The Michaelis-Menten enzyme kinetics model/equation only works under a few simple _____.

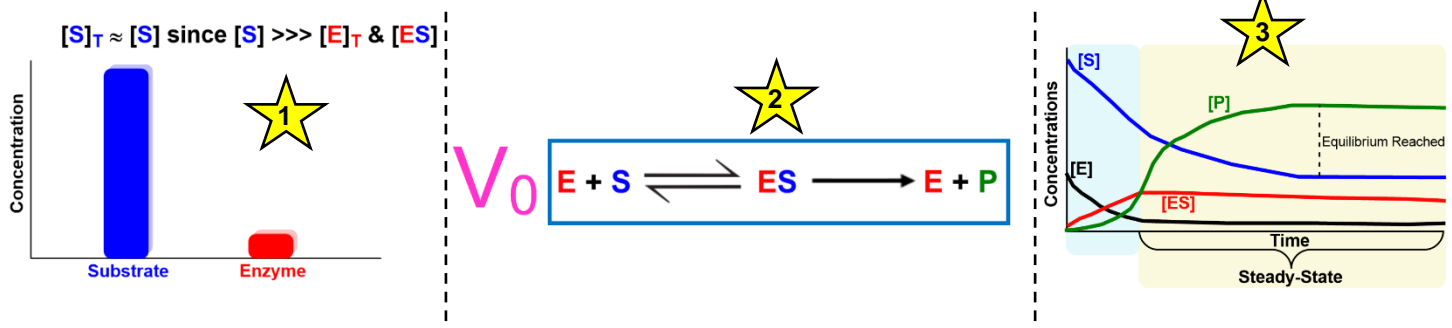**Michaelis-Menten Equation:**

$$V_0 = \frac{V_{max}[S]}{K_m + [S]}$$

$$E + S \rightleftharpoons ES \longrightarrow E + P$$

Michaelis & Menten

3 Michaelis-Menten Assumptions

●The Michaelis-Menten Equation is only derived under the following ____ assumptions:

  ⭐1 **[S]** *Assumption*: (assume $[S]_T \approx [S]$): since **[S]** >>> $[E]_T$, the **[____]** is *negligible* in comparison to **[S]**.

  ⭐2 **V_0** *Assumption*: only **V_0** is measured since _____ reaction from ES ← E + P (k_{-2}) is _____ early on.

  ⭐3 *Steady-State Assumption*: the **[ES]** remains _____, meaning that $V_1 = V_{-1} + V_2$.

EXAMPLE: Assumptions for Michaelis-Menten Kinetics.

$[S]_T \approx [S]$ since **[S]** >>> $[E]_T$ & **[ES]**

V_0 E + S ⇌ ES → E + P

PRACTICE: Which of the following options is not an assumption made in deriving the Michaelis-Menten equation?

  a) The value of k_{-2} can be ignored.

  b) The rate of ES formation = to rate of P formation.

  c) The [E] is smaller than the [S].

  d) a, b & c are all correct assumptions.

PRACTICE: Michaelis & Menten assumed that the initial reaction for an enzyme catalyzed reaction could be written as shown: $E + S \underset{K_{-1}}{\overset{K_1}{\rightleftharpoons}} ES \overset{K_2}{\longrightarrow} E + P$. Using this, the rate/velocity of ES-complex breakdown can be expressed by:

  a) $k_1 ([E]_T - [ES])$.

  b) $k_1 ([E]_T - [ES])[S]$.

  c) $k_2 [ES]$.

  d) $k_{-1} [ES] + k_2 [ES]$.