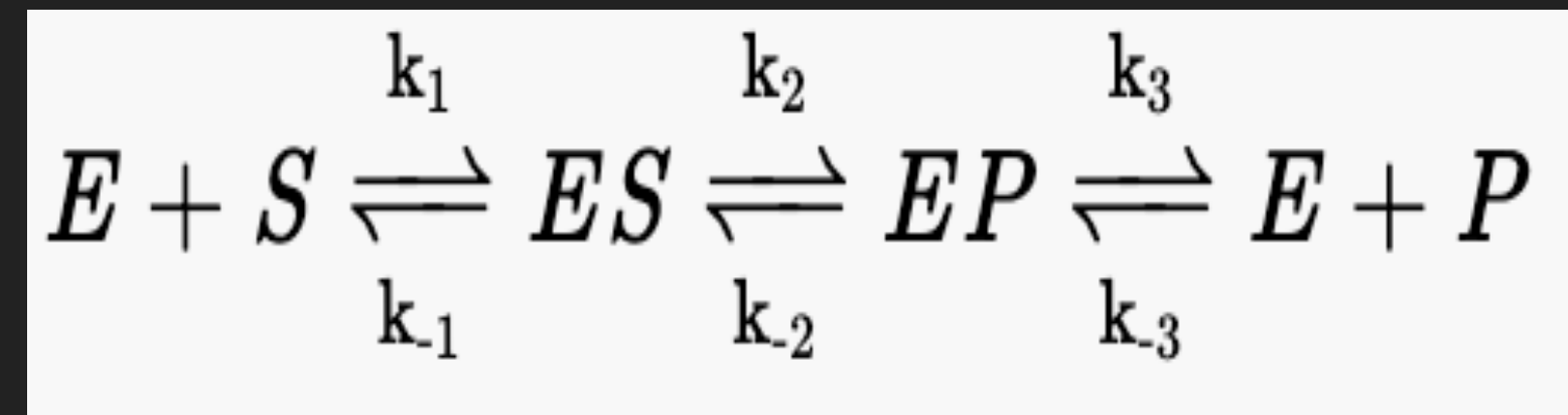


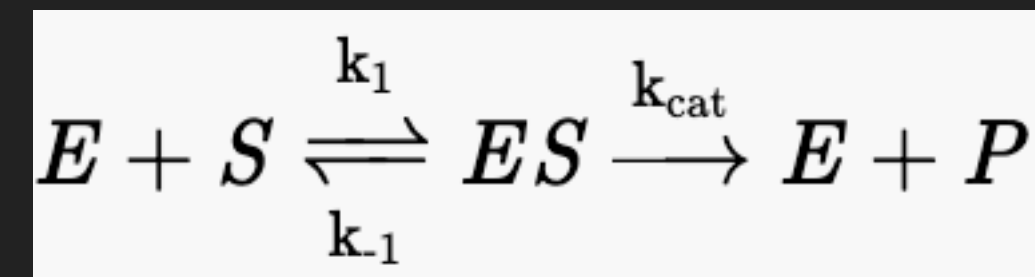
# ASSUMPTIONS OF MICHAELIS-MENTEN EQUATION

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- ▶ If we analyze a reaction at its very beginning ( or its initial rate ) prior to the formation of a significant amount of product, we can assume that the conversion of ES to EP is the rate limiting step.



- ▶ Assuming ES to EP is rate-limiting, aka  $k_1, k_{-1}$ , and  $k_3 \gg k_2$ ,  
We can convert the above reaction to:



- ▶ Substituting the rate constants into one constant called  $k_{\text{cat}}$  or the rate of enzyme catalysis
- ▶ At this point there is little to no product, so the reverse reactions  $k_{-3}$  and  $k_{-2}$  are negligible

# MICHAELIS-MENTEN EQUATION – THE STEADY STATE ASSUMPTION

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1. Enzyme binds with the substrate
  2. ES Concentration Increases
  3. ES concentration will reach **stable point** and remain there until the reaction is nearly complete
- ▶ The “pre” steady state only lasts tenths to hundredths of seconds
    - ▶ We assume the entire reaction takes place under this steady state condition
  - ▶ Because ES is a constant we can assume that the rate of formation of ES equals the rate of ES dissociation plus the rate of conversion of S to P

