(16) Km and Vmax in competitive and non-competitive enzyme Inhibition.

→ **Competitive Inhibition**

- Inhibitor molecules are competing with the normal substrate molecule for binding to the active site of the enzyme, because the inhibitor is a structural analogue of the substrate

$$E + S \rightleftharpoons E\text{-}S \rightarrow E + P$$

$$E + I \rightleftharpoons E\text{-}I$$

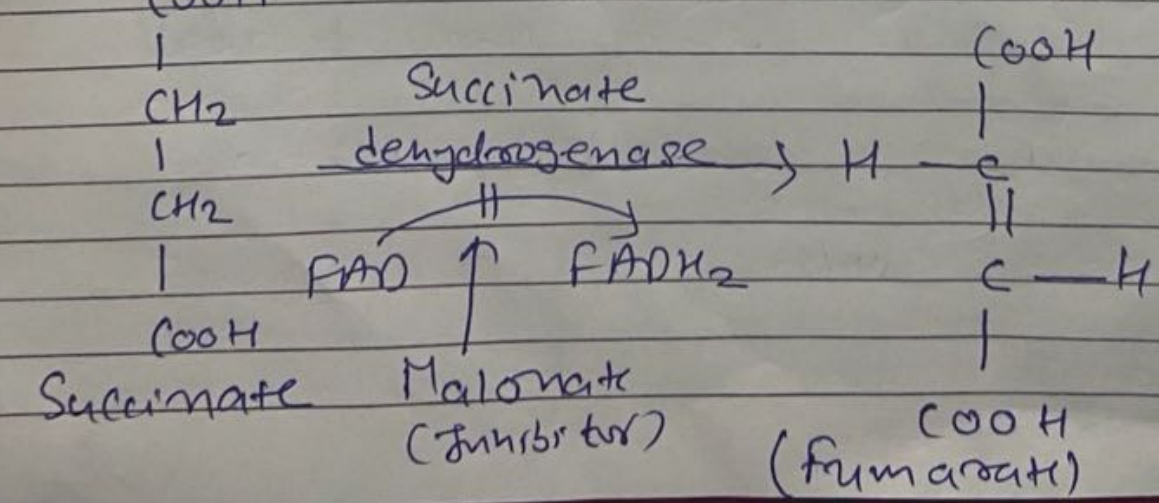
→ E-I (enzyme - Inhibitor complex) can revert only to reform the enzyme and inhibitor

→ The number of enzyme molecules available for E-S formation is reduced

→ Since effective concentration of enzyme is reduced, the reaction velocity is decreased.

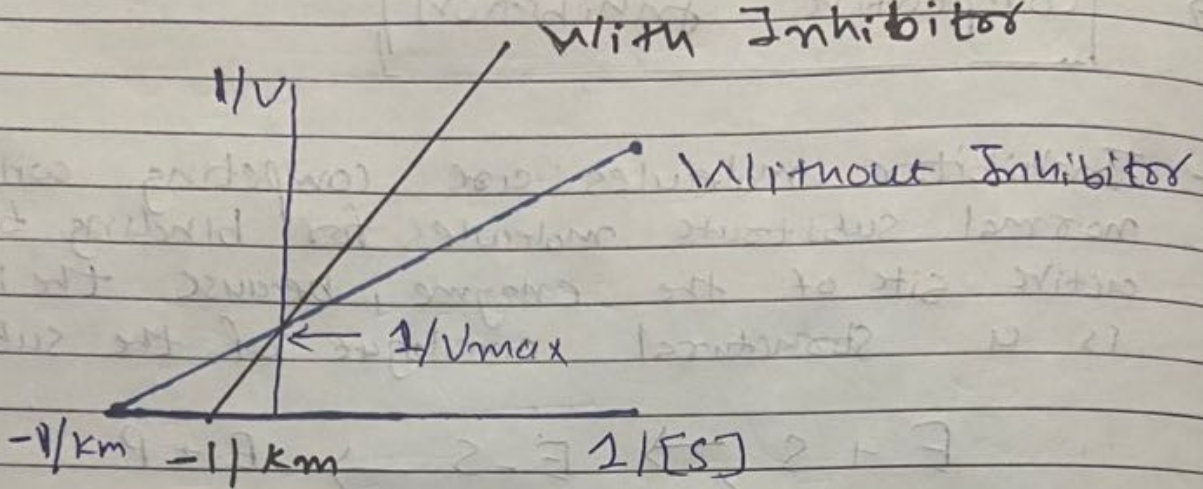
→ Similarity in 3 dimensional structure between substrate & Inhibitor

Example

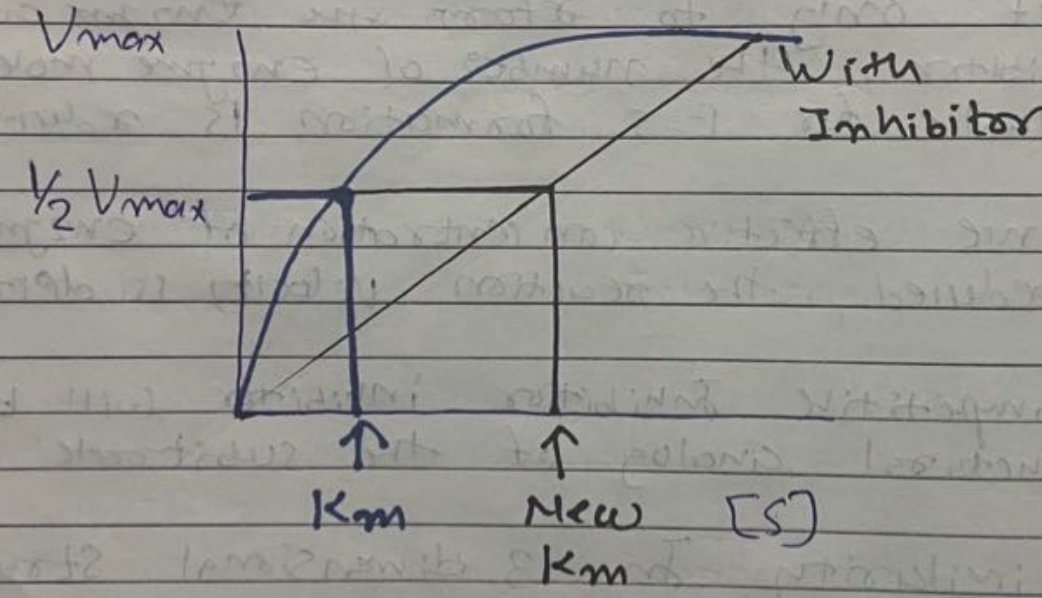


→ Competitive inhibition is usually reversible or excess substrate abolishes the inhibition

→



(A) Lineweaver - Burk Plot



(B) Michaelis - Menten Saturation curve

- From the above graph in competitive inhibition Km is increased in presence of competitive inhibitor
- Affinity of the enzyme towards substrate is apparently decreased in presence of Inhibitor.

→ But Vmax is not changed.

Non competitive Inhibition (Irreversible)

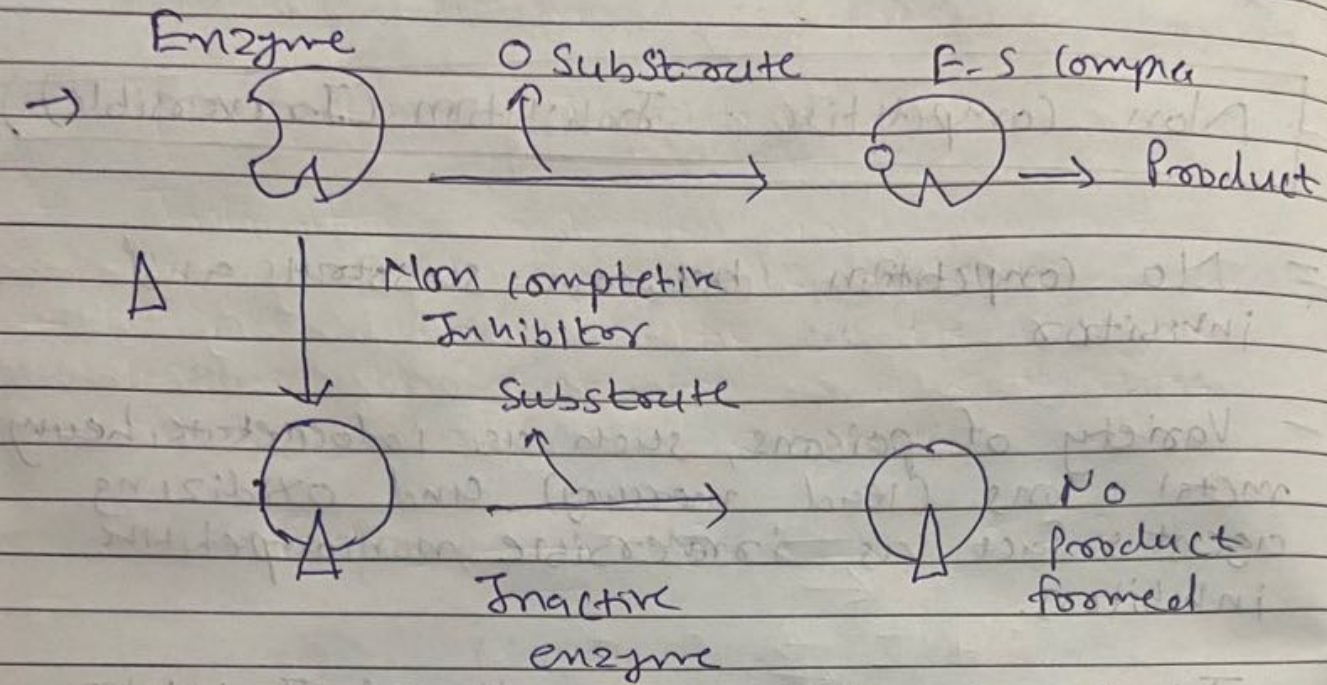
- No competition between substrate and inhibitor
- Variety of poisons, such as iodoacetate, heavy metal ions (lead mercury) and oxidizing agents act as irreversible noncompetitive inhibitors.
- It is also known as Mixed Inhibition.

→ Inhibitor bind to different domain on the enzyme, other than the substrate binding site.

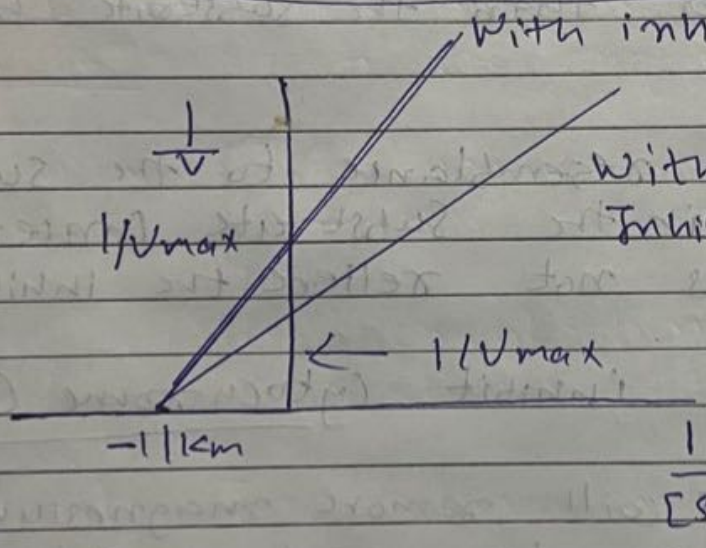
- No structural resemblance to the substrate an increase in the substrate concentration generally does not reliere the inhibition

Ex - Cyanide inhibit Cytochrome Oxidase

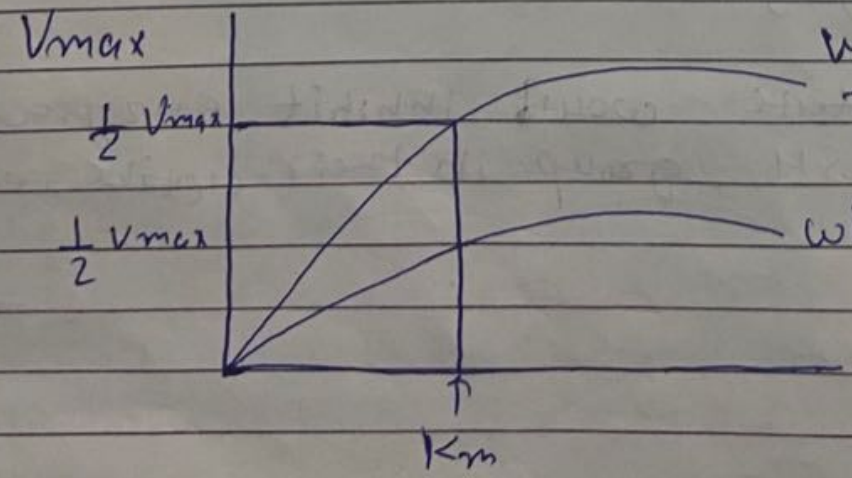
- fluoride will remove magnesium and manganese ions and will inhibit the enzyme enolase and consequently the glycolysis.
- Idoacetate would inhibit enzymes having - SH group in their active center



(A) **Lineweaver - Burk Plot**



(b) Michaelis - Menten saturation curve



→ ~~The inhibi~~

→ The inhibitor combines with the enzymes by forming a covalent bond and then the reaction bilomes irreversible

→ The Velocity (Vmax) is reduced, But Km value is not changed.