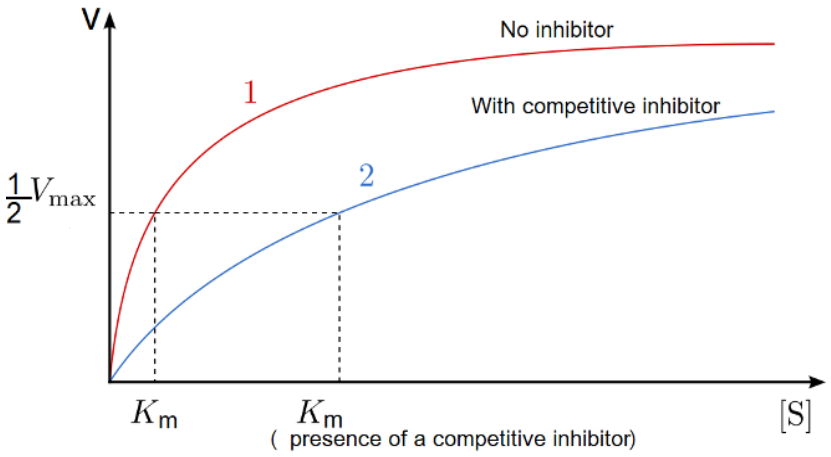
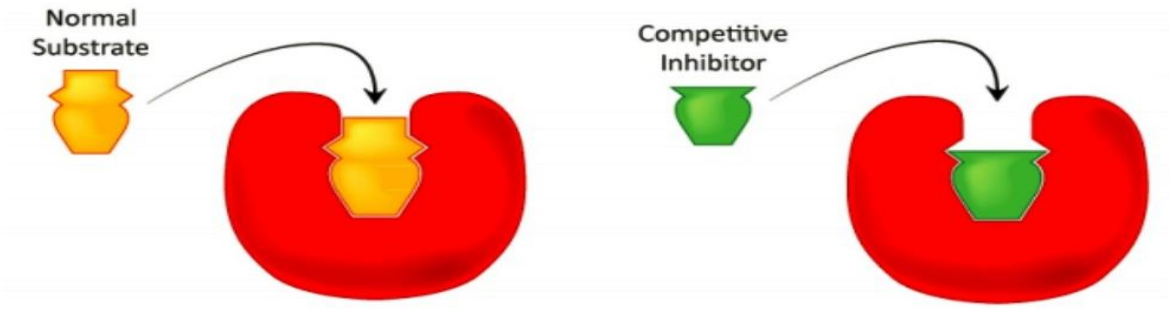
# *Enzymes*

## Inhibitors of Enzymes:-

1. Competitive inhibitors:-

Inhibitors are decreasing the reaction progress by binding to an enzyme, often at the active site, and preventing the real substrate from binding. the substrate and inhibitor cannot bind to the enzyme at the same time, This usually results from the inhibitor having an affinity for the active site of an enzyme where the substrate also binds; the substrate and inhibitor compete for access to the enzyme's active site. This type of inhibition can be overcome by sufficiently high concentrations of substrate ($V_{max}$ remains constant). Competitive inhibitors are often similar in structure to the real substrate.



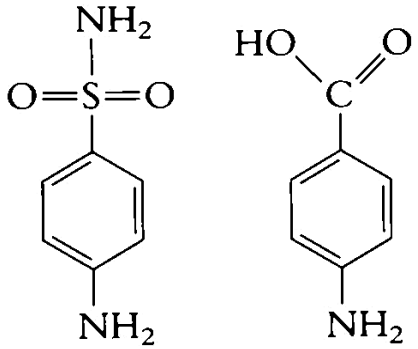




Competitive inhibitors

# *Enzymes*

Example Competitive inhibitors

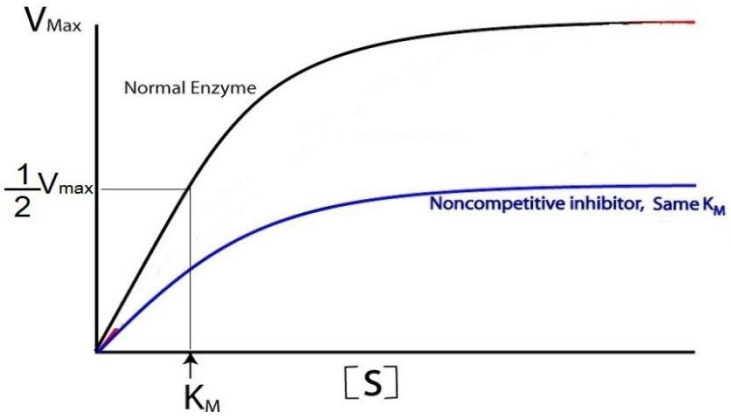
The antibiotic sulfanilamide is similar in structure to para-aminobenzoic acid (PABA), an intermediate in the biosynthetic pathway for folic acid. Sulfanilamide can competitively inhibit the enzyme that has PABA as it's normal substrate by competitively occupying the active site of the enzyme.

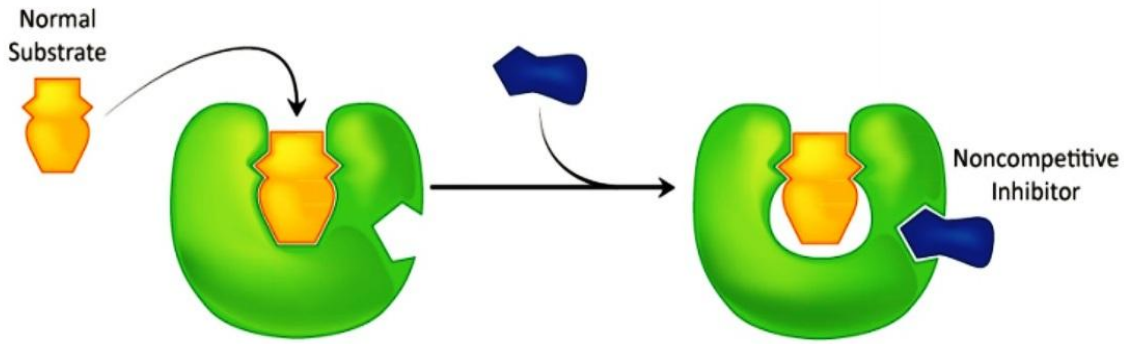



Sulfanilamide PABA

2. Non-Competitive inhibitors:-

Also known as allosteric inhibition .the inhibitor and substrate don't affect one another's binding to the enzyme. When the inhibitor is bind to the different sites of enzyme, the enzyme cannot catalyze its reaction to produce a product. the noncompetitive inhibition acts by reducing the number of functional enzyme molecules that can carry out a reaction. the effect of binding a non-competitive inhibitor is different from binding a competitive inhibitor because there is no competition. In the case of competitive inhibition, the effect of the inhibitor could be reduced by increasing amounts of substrate. This was because increasing substrate made increasing percentages of the enzyme active. With non-competitive inhibition, increasing the amount of substrate has no effect on the percentage of enzyme that is active. in non-competitive inhibition, the percentage of enzyme inhibited remains the same through all ranges of substrate[S]




Non-Competitive inhibitors

3. Uncompetitive inhibitors:-

This inhibitor binds only to the enzyme-substrate (ES) complex. The inhibitor-bound complex forms mostly under concentrations of high substrate and the ES complex cannot release product while the inhibitor is bound, the binding results in decreasing concentration of substrate binding to enzyme, $K_m$, and $V_{max}$, and increasing binding affinity of enzyme to substrate.