

Effects of Inhibitors on Reaction Rate

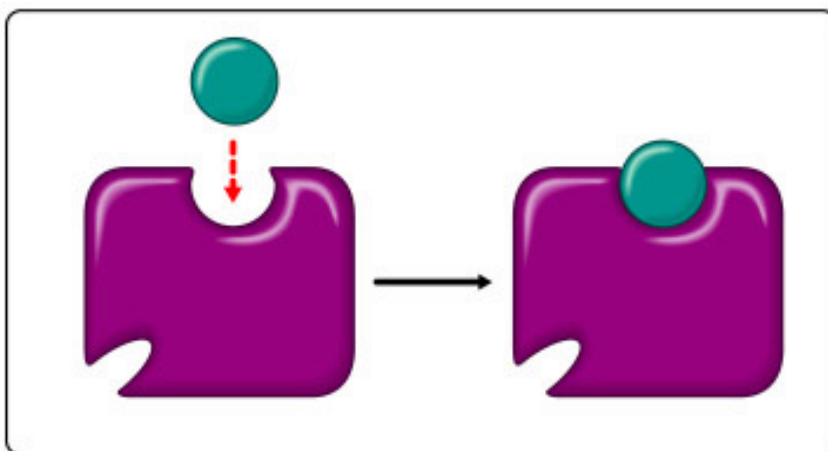
Frequently the effect of an enzyme can be altered by the presence of other substances in solution which may in some manner affect the relationship between the enzyme and its substrate. Such effects are referred to as enzyme inhibition, and the substances bringing about the effect are termed inhibitors. In many instances, the rate of the reaction can be altered because of a competition between the substrate and the inhibitor. This effect may be reversed for some inhibitors by simply increasing the concentration of the substrate. Thus more substrate molecules simply provide an increased probability that substrate will contact the enzyme and “out compete” the inhibitor for sites on the enzyme molecule. This type of inhibition is termed competitive. In a Michaelis-Menten plot would show an unequal V_{max} , but identical K_m .

In lab we will examine the effects of 2 different substances upon hydrolysis of sucrose by invertase

The following information was taken from *Essential Biology* by Campbell, Reece, and Simon.

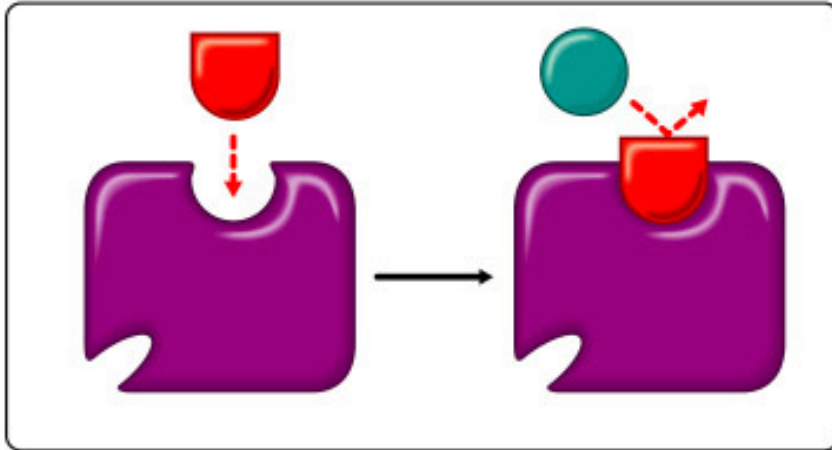
Each enzyme is very selective in the reaction it catalyzes. This specificity is based on the ability of the enzyme to recognize the shape of a certain reactant molecule, which is termed the enzyme's substrate. And the ability of the enzyme to recognize and bind to its specific substrate depends on the enzyme's shape. A special region of the enzyme, called the **active site**, has a shape and chemistry that fits it to the substrate molecule. When a substrate molecule slips into its docking station, the active site changes shape slightly to embrace the substrate and catalyze the reaction. This is called **induced fit**, because the entry of the substrate induces the enzyme to change its shape slightly and make the fit between substrate and active site even snugger.

After the products are released from the active site, the enzyme is once again available to accept another molecule of its specific substrate.



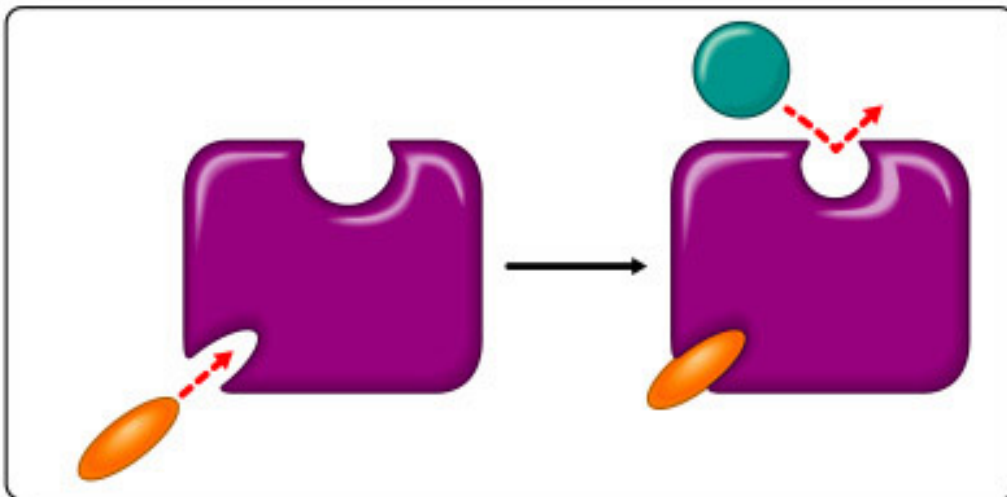
Normal Enzyme action

Certain molecules can inhibit a metabolic reaction by binding to an enzyme and disrupting its function. Some of these enzyme inhibitors are actually substrate imposters that plug up the active site.



Competitive Inhibition

Other inhibitors bind to the enzyme at some site remote to the active site, but the binding changes the shape of the enzyme so that its active site is no longer receptive to the substrate. In some cases, the binding is reversible, enabling certain inhibitors to regulate metabolism.



Non-Competitive Inhibitor