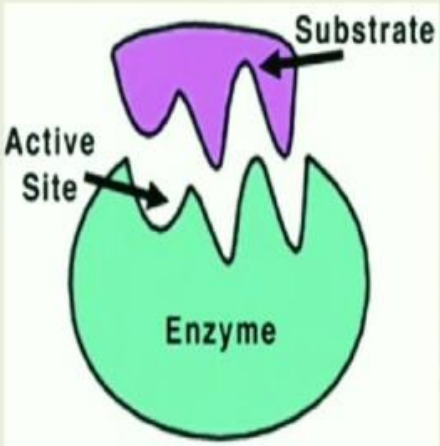
ENZYMES

- Enzymes are biological molecules (typically proteins) that significantly speed up the rate of virtually all of the chemical reactions that take place within cells.
- They are vital for life and serve a wide range of important functions in the body, such as aiding in digestion and metabolism



ENZYMES

- The molecules at the beginning of the process are called substrates
- The enzyme converts these into different molecules, called products.

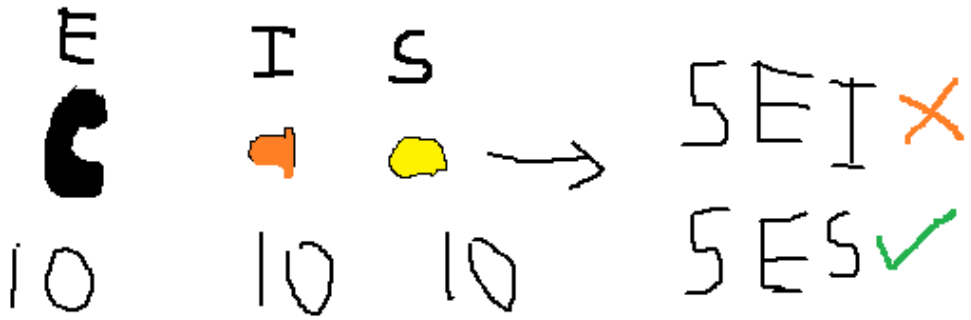
ENZYME INHIBITION

The activities of enzymes must be regulated and one way to do this is by using molecules called inhibitors.

THERE ARE THREE (3) TYPES OF INHIBITION.

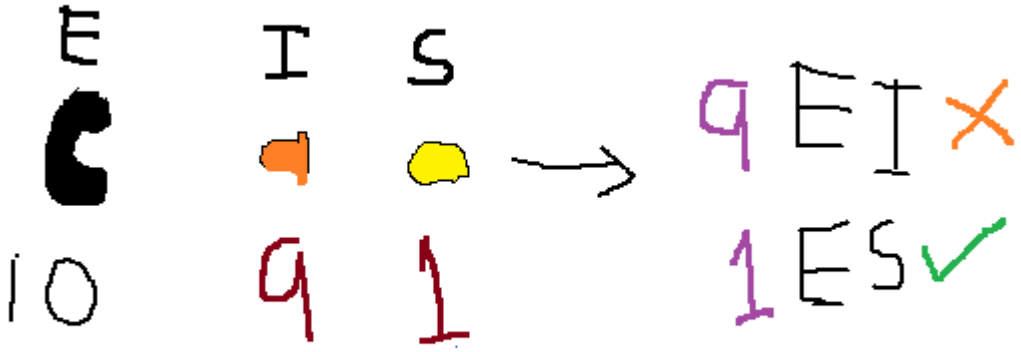
A. competitive inhibition:

- There is competition between the substrate and the Inhibitor. This is because they have the same/similar conformational structure.
- The inhibitor binds non-covalently to the active site of the enzyme because of its resemblance.
- It results in product formation, however, reduced in amount.



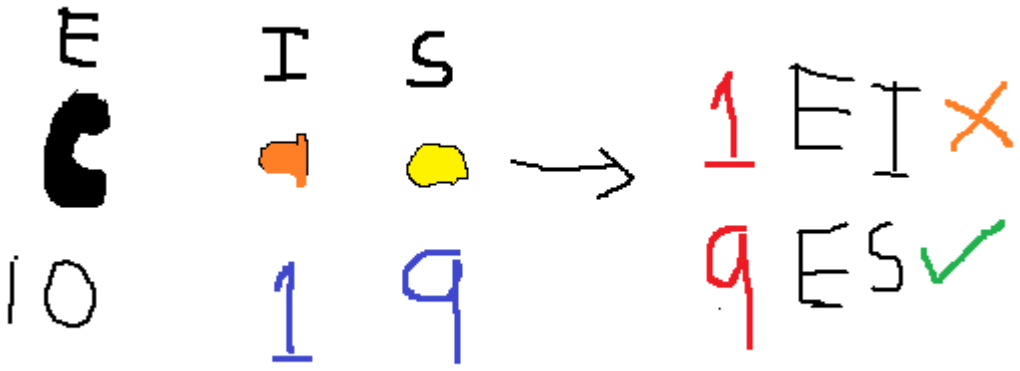
- Competitive inhibition is reversible when the concentration of substrate increases while keeping inhibitor concentration constant.

FIG.1



In Fig.1 the enzyme has a stronger affinity for the inhibitor due to its high concentration. Thus, more enzyme-inhibitor complexes are formed. This complex does not form products.

Fig. 2



In **fig.2,** the ratio of the inhibitor to the substrate is 1:9. That is, the enzymes have a higher chance of forming bonds with the substrate than with inhibitors.

Thus, the enzyme now has a higher affinity for the substrate than for inhibitor.

Non-competitive.

There is no competition between the substrate and inhibition because:

i. Both the Substrate and inhibitor have different conformational structures.

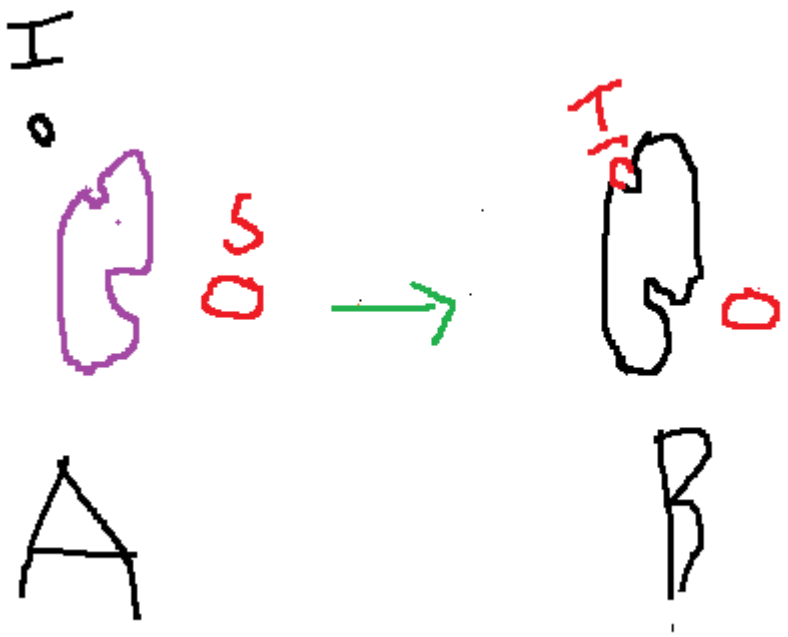
ii. There is the presence of allosteric sites.

NB: The Inhibitor first binds to its allosteric site on the Enzyme, changing its conformation, so that the substrate no more fits perfectly into the active site or does not fit at all.

EXAMPLES of non-competitive inhibitor is CYANIDE.

1. CYANIDE + Cytochrome oxidation = Stops cellular respiration which can lead to instant death.

2. Penicillin is a non-competitive Inhibitor of the enzyme required for cell wall formation in bacteria.



Uncompetitive inhibition:

In this inhibition process, the inhibition only binds to the enzyme once the substance is bound. In this case, the binding of the substance to the active site of enzyme creates a new site to which the inhibitors can bind.