ENZYMES

All chemical reactions require some input of energy (**activation energy, E_A**) to initiate them.

In the reaction, **substrates** (reactants) are converted into products.

If the products end up with LESS stored energy than the substrates initially had, a net amount of energy has been RELEASED by the reaction.

This is called an **exergoni**c or **exothermic** reaction (eg. cellular respiration).

<u>Draw Fig. 1(a), pg. 69 in your notes</u>

If the products end up with MORE stored energy than the substrates initially had, a net amount of energy has been ABSORBED by the reaction.

This is called an **endergonic** or **endothermic** reaction (eg. photosynthesis).

<u>Draw Fig. 1(b), pg. 69 in your notes</u>

The speed at which a chemical reaction proceeds is determined by the amount of **activation energy** required.

Biological catalysts (ie. enzymes, which are proteins), speed up reactions by **lowering** the required activation energy.

Enzymes are highly specific about the reactions they catalyze. This is because the substrate must *bind* with the enzymes **active site**.

Draw Fig. 3, pg. 70) in your notes

Enzyme + substrate ---> enzyme-substrate complex ---> enzyme + product

The substrate must fit precisely, like a key in a lock, into the enzyme's active site. When the substrate binds, the enzyme **strains and correctly orients** the bonds making them more reactive. This is how activation energy is lowered and reactions can proceed at body temperature.

Enzymes function best at a specific **temperature** and **pH**. A drastic change in either results in a change in the enzyme's *shape* (**denaturation**) and a loss of function

Draw Fig. 5(a,b) on pg. 72 in your notes