# Edexcel GCSE Biology Key Concepts Part 2

## Enzymes

**Enzymes catalyse (increase the rate of) specific reactions in living organisms.**

The activity of enzymes is affected by changes in temperature, pH and substrate concentration

| *Enzymes activity has an optimum temperature* | *Enzyme activity has an optimum pH* | *Increasing substrate concentration increases rate (limited by number of active sites)* |
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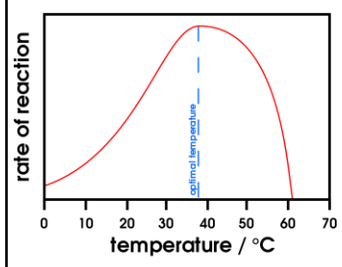
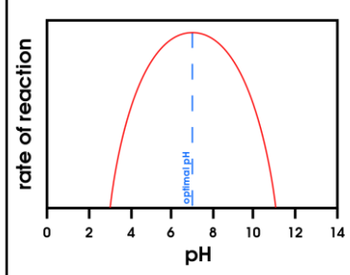
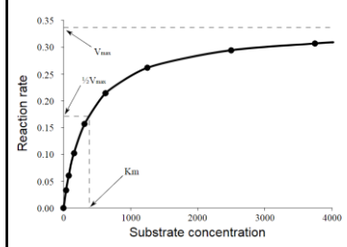
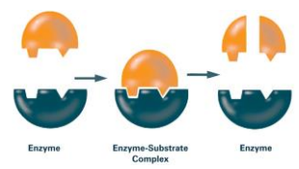
|   |   |   |

**The 'lock and key theory' is a simplified model to explain enzyme action**



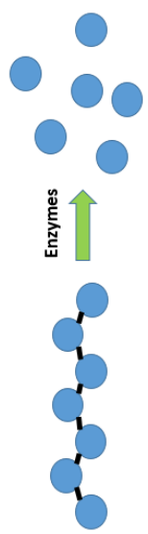

Enzymes catalyse specific reactions in living organisms due to the shape of their active site.

**Digestive enzymes speed up the conversion of large insoluble molecules (food) into small soluble molecules that can be absorbed into the bloodstream.**

**Large changes in temperature or pH can stop the enzyme from working (denature).**

| *Temperature too high* | *pH too high or too low* |
|---|---|

Enzyme changes shape (denatures) the substrate no longer fits the active site.

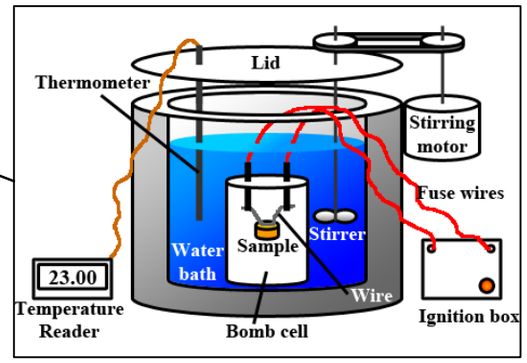
| | | | |
|---|---|---|---|
| **Carbohydrases (e.g. amylase)** |   | *Made in salivary glands, pancreas, small intestine* | Break down carbohydrates to simple sugar (e.g. amylase breaks down starch to glucose). |
| **Proteases** | | *Made in stomach, pancreas* | Break down protein to amino acids. |
| **Lipases** | | *Made in pancreas (works in small intestine)* | Break down lipids (fats) to glycerol and fatty acids). |

The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used for respiration.

## Calorimetry

The rate of a reaction can be measured by how fast reactants are used up or by how fast products are formed.

**The energy in food can be calculated by how much it heats up water when it burns in a calorimeter.**




## Osmosis

**Calculate percentage gain/loss of mass in osmosis.**

$$\%\ change\ in\ mass = \frac{(final\ mass\ -\ initial\ mass)}{initial\ mass} \times 100$$

The greater the difference in concentrations the faster the rate of diffusion.

## Transport in cells

| | | |
|---|---|---|
| **Diffusion** ***No*** energy required | *Movement of particles in a solution or gas from a higher to a lower concentration* | E.g. $O_2$ and $CO_2$ in gas exchange, urea in kidneys. Factors that affect the rate are concentration, temperature and surface area. |
| **Osmosis** ***No*** energy required | *Movement of water from a dilute solution to a more concentrated solution* | E.g. Plants absorb water from the soil by osmosis through their root hair cells. Plants use water for several vital processes including photosynthesis and transporting minerals. |
| **Active transport** ***ENERGY*** required | *Movement of particles from a dilute solution to a more concentrated solution* | E.g. movement of mineral ions into roots of plants and the movement of glucose into the small intestines. |