

Intermediate 2 Biology
Chapter 4 - Respiration Revision Notes

Energy

All food contains **chemical energy**. The amount of chemical energy that a food contains is measured in kilojoules (kJ) and is released when food is burned. The energy contained within food can be used for movement or heat production.

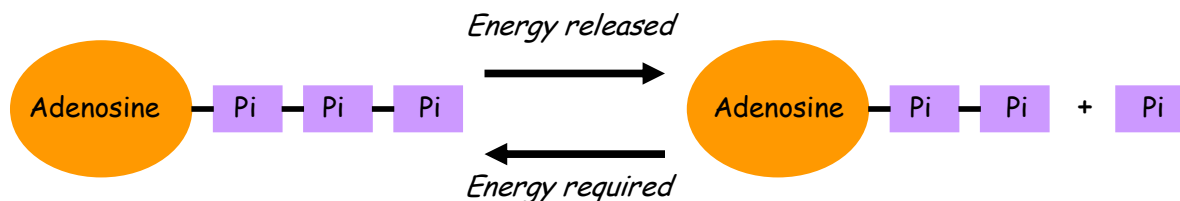
Respiration

Respiration is the process by which energy is released from food. This process takes place in living cells. **Aerobic** respiration occurs when oxygen is present. When there is a lack of oxygen the cell will switch to **anaerobic** respiration.

ATP

The function of ATP is to provide energy for cellular processes such as muscle contraction, cell division, protein synthesis and DNA replication.

ATP is formed from one molecule of adenosine joined to three phosphate groups (Pi). ATP can be broken down into ADP and Pi, and reformed in a process called phosphorylation.



Aerobic respiration

This form of respiration takes place in living cells when oxygen is present. The process is the same in animals, plants and yeast. Aerobic respiration can be summarised by the following equation:



Although the summary equation is useful to provide an overview of aerobic respiration it does not show the details of the process. Aerobic respiration occurs in two stages. The first of these is **glycolysis**:



Stage two:



Anaerobic respiration

This form of respiration takes place in living cells when oxygen is in short supply/absent. Anaerobic respiration in animals differs from anaerobic respiration in plants and yeast.

Animals

The summary equation for anaerobic respiration in animals is:



If we break this down into stages we can see that glycolysis takes place as normal. The pyruvic acid formed is then converted into lactic acid:



When lactic acid builds up in the muscles (e.g. during exercise) the muscles start to stiffen and become sore. After exercise the muscles gradually return to normal. This is because the conversion of pyruvic acid into lactic acid is a reversible process. Once exercise has finished oxygen is used to change lactic acid back into pyruvic acid. This pyruvic acid then re-enters the aerobic pathway.

Plants and Yeast

The summary equation for anaerobic respiration in animals is:



If we break this down into stages we can see that glycolysis takes place as normal. The pyruvic acid formed is then converted into carbon dioxide and ethanol:



This process is irreversible.