

Respiration

It is the process of transferring energy from glucose to every cell. IT IS NOT BREATHING IN AND OUT. (Ventilation) It occurs in both plants and animals. Is an exothermic reaction. (Transfers energy to the environment)

Aerobic respiration

Aerobic = requires oxygen. It is the most efficient way to transfer energy from glucose. It happens all the time in plants and animals. Occurs within mitochondria

Use of respired energy

- ❖ Maintain steady body temperatures in birds and mammals
- ❖ Build larger molecules from smaller ones
- ❖ Allow muscles to contract in animals

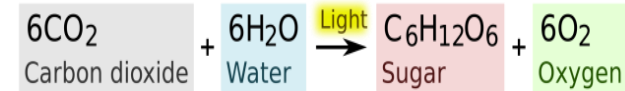
Glucose

Used in different ways in plants:

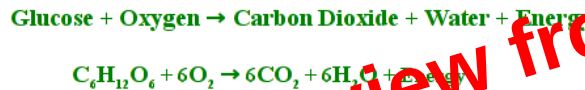
- Respiration – transfer energy
- Making cellulose – makes strong cell walls
- Making Amino acids – for proteins
- Stored as fats/oil – In seeds
- Stored as starch – in roots, stem and leaves. For winter. It is insoluble so it is better for storage as it takes in lots of water

Photosynthesis

It takes place within chloroplasts. Energy is transferred to chloroplasts from the environment by light. It is an endothermic reaction (takes in energy)



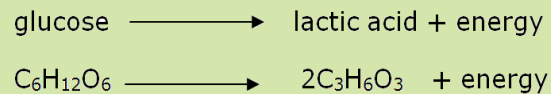
Aerobic respiration



Anaerobic respiration

Anaerobic = without oxygen. It is the incomplete breakdown of glucose, creating lactic acid. Only useful in emergencies as it doesn't transfer as much energy as aerobic respiration because glucose is not fully oxidised.

Anaerobic respiration in muscle cells



Anaerobic respiration in plants and yeast

In yeast cells, anaerobic respiration is called fermentation. Fermentation is great as it is used to make bread and alcoholic drinks.

Carbon dioxide from fermentation makes the bread rise. Ethanol from fermentation makes drinks alcoholic.



Oxygen debt

It is the amount of extra oxygen your body needs to react with the build up of lactic acid and remove it. You have to repay your body back with oxygen. So, you need to breathe hard for awhile to get more oxygen into your blood. The blood entering the muscles transports lactic acid to the liver where it is converted back to glucose

Exercise

It makes you respire more, this is because:

- Muscles contract more, requiring more energy.
- More energy = more respiration = more oxygen
- Breathing rate + breath volume increases to get more oxygen into blood
- Heart rate increases to get oxygenated blood around the body
- Vigorous exercise causes anaerobic respiration to take place as body cannot supply oxygen.
- Not a good thing as it causes lactic acid to build up in muscles.
- Long periods of exercise causes muscle fatigue so muscles get tired and stop efficiently contracting

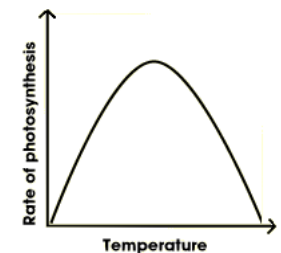
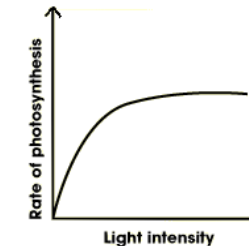
Limiting Factors

Limiting factors of photosynthesis include:

- Chlorophyll – photosynthesis decreases when amount of chlorophyll is low (affected by disease e.g. TMV)
- Light intensity – photosynthesis decreases in dark conditions
- Temperature – photosynthesis decreases in cold temperatures and extreme temperatures
- Water accessibility – photosynthesis decreases when there is a low amount of water and humidity
- Carbon Dioxide – photosynthesis decreases when there is a low concentration of Carbon Dioxide

$$\text{Light intensity} \propto \frac{1}{\text{distance}^2}$$

As distance increases, light intensity decreases.



Ideal conditions

- ❖ Greenhouses – trap heat from sun
- ❖ Artificial light – for when it's dark
- ❖ Paraffin heater – heats up greenhouse, creating carbon dioxide while burning.
- ❖ Fertilisers – provides minerals for healthy growth
- ❖ Pesticides – Prevents pests and diseases

