

Cellular Respiration

A catabolic process

Oxidation of food substances that produces energy.

- Occurs in all living cells
- Energy released is stored in the form of ATP

ATP, Adenosine tri-phosphate

- Universal energy currency
- Constantly recycled with ADP
- Contains a lot of chemical energy
- Takes part in metabolic reactions (e.g. muscle contraction)
- Delivers energy in small amounts to drive individual reactions
- Involved in both exothermic (release heat) and endothermic (absorb heat) reactions

Aerobic Respiration

Requires Oxygen

Produces a lot of energy (best-case : 38 ATP)

Glucose + Oxygen → Carbon dioxide + Water + Energy (ATP)

$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy (ATP)}$

Uses of energy from respiration

- Synthesis of proteins from amino acids
- Building up of protoplasm for growth
- Cell division
- Muscular contractions such as heartbeats and respiratory movements
- Active Transport in absorption of food by small intestine
- Transmission of nerve impulses
- Maintenance of Body Temperature

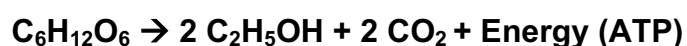
Anaerobic Respiration

In absence of oxygen

Produces Very little energy (2ATP)

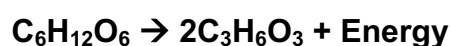
In yeast cells and bacteria

Glucose → Ethanol + Carbon dioxide + Energy (ATP)



In Muscles

Glucose → Lactic Acid + Energy



Used when insufficient energy is transported to muscles.

Lactic Acid in Human Muscle Cells causes fatigue and muscular pains

Oxygen debt is the amount of oxygen required to oxidise the lactic acid produced in muscles during anaerobic respiration.

Yeast

Facultative anaerobes (can respire aerobically and anaerobically)

Anaerobic Respiration of yeast called fermentation

- Produces ethanol and carbon dioxide
- Used in wine making, bread making.

Aerobic	Anaerobic
Large amount of ATP	Small Amount of ATP
Waste products – Carbon dioxide and Water	Lactic Acid/ Ethanol
Non-harmful waste products	Waste products harmful to organisms