Process of anaerobic respiration

Anaerobic respiration includes glycolysis taking place in the cytoplasm and the phosphorylation of glucose.

The phosphorylated hexose splits into two 3 carbon molecules and pyruvate is formed and reduced NAD and ATP are produced.

2 ATPs are produced for each ATP used and pyruvate is converted to lactic acid.

NAD is regenerated.

The fact of reduced NAD in aerobic respiration

The reduced NAD from the glycolysis enters the mitochondria and moves into the inner membrane of the mitochondria.

Reduced NAD becomes oxidised as electrons are transferred to the electron transport chain.

The hydrogen ions are pumped into the intermembrane space and NAD returns to the Krebs cycle.

Why NAD needs to be oxidised in the mitochondria

So that hydrogen can be delivered to the electron transport chain to allow ATPase to regenerate NAD

Role of Krebs Cycle

The Krebs cycle completely oxidises pyruvate to release as much energy as possible for the generation of ATP so that ATP can be produced by oxidative phosphorylation.

Meaning of oxidative phosphorylation

Oxidative phosphorylation is where electrons are passed along an electron transport chain and lose energy at each electron carrier.

One hydrogen is pumped through matrix to the intermembrane space and an electrochemical gradient forms.

Chemiosmosis occurs where protons move back into the matrix via ATPase and oxygen is the final electron acceptor.

ATP usage to supply energy for bio proc

The hydrolysis of ATP/bonds releases energy.

Why some ATP is broken down during glycolysis

Because the breakdown of ATP donates phosphate to the glucose.

ATP supplies energy to break down the glucose to produce phosphorylated 3-carbon compounds.

How CH4 affects production of ATP

Carbon monoxide would cause less ATP being produced because the haemoglobin cannot transport oxygen.

This means that the cells would therefore have no/less final electron acceptor.

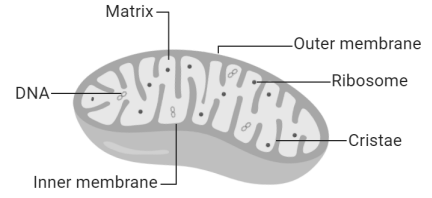
Structure of mitochondria

The inner membrane of the mitochondria is highly folded into cristae providing the mitchondria a large surface area.

Matrix (inside of the inner membrane of mitochondria) - where Krebs cycle takes place.

Stalked proteins - on the inner membrane of the mitochondria.

Diagram of mitochondria



You need to be aware of what the mitochondria looks like for the exams.

Why cyanide is dangerous

Cyanide inhibits cytochrome oxidase (one of the electron carriers) meaning that it can no longer accept electrons.

The electrons would then stop moving along the electron transport chain so there would be no movement of hydrogen ions into the intermembrane space.

There would also be no chemiosmosis occurring.

The coenzymes NADH/FADH cannot give up electrons and regenerate NAD/FAD so the Kreb cycle would stop.

There would be no cellular processes occurring like for example heart muscles would no longer receive oxygen causing death.

Electron carriers

1. cytochomes — protein pigments with an iron group — ATP produced

2. cytochrome oxidase — receives the electrons from cytochromes — ATP produced

3. oxygen — final hydrogen and electron acceptor in the chain — water formed here

Note: You need to have an awareness about these names, you do not need to know them for the exam.