

Edexcel (B) Biology A-level

5.1 - 5.4 - Aerobic respiration and its stages

Flashcards

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State the purpose of aerobic respiration.



State the purpose of aerobic respiration.

Produces ATP, which can be hydrolysed to ADP + Pi

To release energy for metabolic reaction/
phosphorylate compounds to make them more reactive.



Name the 4 main stages in aerobic respiration and where they occur.



Name the 4 main stages in aerobic respiration and where they occur.

Glycolysis: cytoplasm

Link reaction: mitochondrial matrix

Krebs cycle: mitochondrial matrix

Oxidative phosphorylation via electron transfer chain: membrane of cristae



Outline the stages of glycolysis.



Outline the stages of glycolysis.

1. Glucose (a hexose sugar) is phosphorylated to glucose phosphate by 2x ATP.
2. Glucose phosphate splits into 2x triose phosphate (TP).
3. 2x TP is oxidised to 2x pyruvate.

Net gain of 2x reduced NAD & 2x ATP per glucose.



How does pyruvate from glycolysis enter the mitochondria?



How does pyruvate from glycolysis enter the mitochondria?

via active transport



What happens during the link reaction?



What happens during the link reaction?

1. Complete oxidation of **pyruvate to acetate**.
per pyruvate molecule: net gain of **1xCO₂**
(decarboxylation) & 2H atoms (used to
reduce 1xNAD)
2. Acetate combines with coenzyme A (CoA)
to form **acetylcoenzyme A**.



Give a summary equation for the link reaction.



Give a summary equation for the link reaction.

pyruvate + NAD + CoA



acetyl CoA + reduced NAD + CO₂



What happens in the Krebs cycle?



What happens in the Krebs cycle?

series of redox reactions produces:

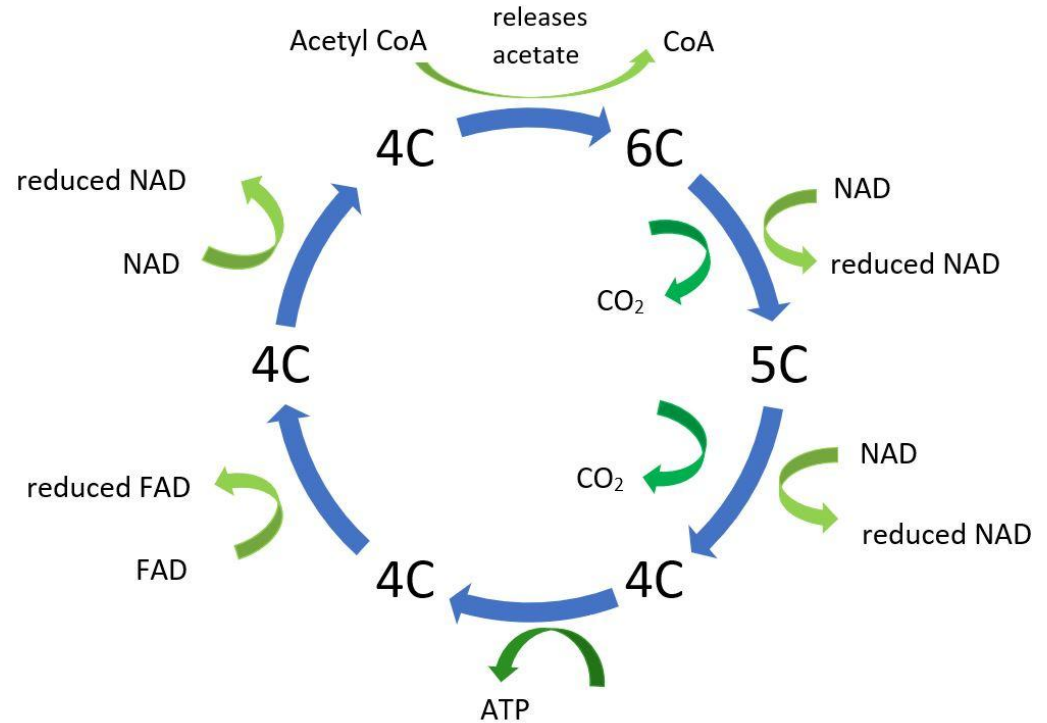
- ATP by substrate-level phosphorylation
- reduced coenzymes e.g. NADH.
- CO₂ from decarboxylation.



Outline the stages of the Krebs cycle.



Outline the stages of the Krebs cycle.



What is the electron transfer chain?



What is the electron transport chain?

A series of carrier proteins embedded in membrane of the cristae of mitochondria.



Name the process that the electron transfer chain uses to produce ATP in aerobic respiration.



Name the process that the electron transfer chain uses to produce ATP in aerobic respiration.

Oxidative phosphorylation via chemiosmosis.



What happens in the electron transfer chain (ETC)?



What happens in the electron transfer chain (ETC)?

Electrons released from reduced NAD & FAD undergo successive redox reactions.

The energy released is coupled to maintaining proton gradient or released as heat.

Oxygen acts as final electron acceptor.



How is a proton concentration gradient established during chemiosmosis in aerobic respiration?



How is a proton concentration gradient established during chemiosmosis in aerobic respiration?

Some energy released from the ETC is coupled to the active transport of H^+ ions (protons) from the mitochondrial matrix into the intermembrane space.



How does chemiosmosis produce ATP during aerobic respiration?



How does chemiosmosis produce ATP during aerobic respiration?

H⁺ ions (protons) move down their **concentration gradient** from the **intermembrane space** into the **mitochondrial matrix** via the channel protein **ATP synthase**.

ATP synthase catalyses $\text{ADP} + \text{P}_i \rightarrow \text{ATP}$.



State the role of oxygen in aerobic respiration.



State the role of oxygen in aerobic respiration.

Final electron acceptor in electron transfer chain.

(produces water as a byproduct)



What is the benefit of an electron transfer chain rather than a single reaction?



What is the benefit of an electron transfer chain rather than a single reaction?

- Energy is released gradually.
- Less energy is released as heat.

