

WJEC (Eduqas) Biology A-level

Topic 1.3 - Respiration

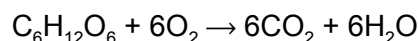
Definitions and Concepts

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Acetyl coenzyme A - A two-carbon molecule formed in the link reaction when acetate reacts with coenzyme A. It is oxidised in the Krebs cycle.

Aerobic respiration - A form of cellular respiration that takes place in the presence of oxygen and produces carbon dioxide, water and ATP. It involves four main stages: glycolysis, link reaction, Krebs cycle, and the electron transport chain. Overall:

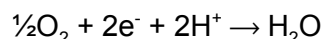


Anaerobic respiration - A form of cellular respiration that takes place in the absence of oxygen. In animals, lactate is produced. In plants and microorganisms, ethanol and carbon dioxide are produced. Less ATP is formed than in aerobic respiration.

Coenzyme A - A coenzyme that binds an acetyl group to form acetyl coenzyme A during the link reaction of aerobic respiration.

Deamination - The removal of the amino group from a molecule. In the liver, amino acids are deaminated to form keto acids and ammonia.

Electron acceptor - Oxygen acts as the final electron acceptor in the electron transfer chain:



Electron transport chain (ETC) - A series of electron carrier proteins that transfer electrons in a chain of oxidation-reduction reactions.

FAD - A coenzyme that becomes reduced when it takes up hydrogen atoms during the Krebs cycle, forming reduced FAD.

Glycolysis - The first stage of aerobic and anaerobic respiration that takes place in the cytosol of the cell and breaks down glucose into two molecules of pyruvate. Two molecules of ATP and two molecules of reduced NAD are also formed.

Inner mitochondrial membrane - The mitochondrial membrane that segregates the matrix from the intermembrane space. It is the site of the electron transport chain.

Krebs cycle - A series of oxidation-reduction reactions in the matrix of the mitochondria in which acetyl coenzyme A is oxidised generating reduced NAD, reduced FAD, ATP and carbon dioxide.

Link reaction - The second stage of aerobic respiration (also known as 'oxidative decarboxylation') that takes place in the mitochondrial matrix and converts pyruvate into acetyl coenzyme A and carbon dioxide. Reduced NAD is also formed. Overall:



NAD - A coenzyme that becomes reduced when it takes up hydrogen atoms during aerobic respiration, forming reduced NAD.



Oxidation - The loss of electrons, gain of oxygen or loss of hydrogen in a substance.

Oxidative decarboxylation - See 'link reaction'.

Pyruvate - A three-carbon molecule produced in glycolysis. In aerobic respiration, pyruvate is oxidised to acetate in the link reaction. In anaerobic respiration it is converted to lactate (animals) or ethanol and carbon dioxide (plants and microorganisms).

Reduction - The gain of electrons, loss of oxygen or gain of hydrogen in a substance.

Respiration - A set of metabolic reactions that take place in organisms and break down respiratory substances, such as glucose, into smaller inorganic molecules, like water and carbon dioxide. This is linked to the synthesis of ATP.

Triose phosphate (TP) - A three-carbon compound formed in glycolysis and the light-independent stage of photosynthesis. It may serve as a starting material for the formation of organic molecules or be used to regenerate RuBP.

