Cell energy definition

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Cellular respiration is the process through which cells convert sugars into energy. To create ATP and other forms of energy to power cellular reactions, cells require fuel and an electron acceptor which drives the chemical process of turning energy into a useable form.

Eukaryotes, including all multicellular organisms and some single-celled organisms, use aerobic respiration to produce energy. Aerobic respiration uses oxygen - the most powerful electron acceptor available in nature.

Aerobic respiration is an extremely efficient process allows eukaryotes to have complicated life functions and active lifestyles. However, it also means that they require a constant supply of oxygen, or they will be unable to obtain energy to stay alive.

Prokaryotic organisms such as bacteria and archaebacteria can use other forms of respiration, which are somewhat less efficient. This allows them to live in environments where eukaryotic organisms could not, because they do not require oxygen.

Examples of different pathways for how sugars are broken down by organisms are illustrated below:

More detailed articles on aerobic respiration and anaerobic respiration can be found on this site. Here we will give an overview of the different types of cellular respiration.

The equation for aerobic respiration shows glucose being combined with oxygen and ADP to produce carbon dioxide, water, and ATP:

You can see that once it is completely broken down, the carbon molecules of glucose are exhaled as six molecules of carbon dioxide.

In lactic acid fermentation, one molecule of glucose is broken down into two molecules of lactic acid. The chemical energy that was stored in the broken glucose bonds is moved into bonds between ADP and a phosphate group.

C6H12O6 (glucose) + 2 ADP (depleted ATP) + 2 Pi (phosphate groups) -> 2 CH3CHOHCOOH (lactic acid) + 2 ATP

Alcohol fermentation is similar to lactic acid fermentation in that oxygen is not the final electron acceptor. Here, instead of oxygen, the cell uses a converted form of pyruvate to accept the final electrons. This creates ethyl alcohol, which is what is found in alcoholic beverages. Brewers and distillers use yeast cells to create this alcohol, which are very good at this form of fermentation.

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Glycolysis is the only step which is shared by all types of respiration. In glycolysis, a sugar molecule such as glucose is split in half, generating two molecules of ATP.

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