

# Respiration: An Overview

- **ATP** is the energy currency of the cell. The hydrolysis of the high-energy bond in ATP can be coupled to endergonic reactions to drive them.
- ATP is generated through a process called **respiration**. Respiration involves capturing the energy stored in the bonds in glucose and storing that energy in the form of ATP.
- Respiration begins with a process called **glycolysis**. If oxygen is present, the end products of glycolysis will proceed to the **Krebs cycle**. If oxygen is not present, the end products will undergo **fermentation**.

<p><b>Glucose</b></p> <p>respiration is: the removal of energy from organic molecules and storing it in ATP</p> <p>energy is released when the bond is broken</p> <p><b>ATP</b></p> <p>this process is called <b>respiration</b></p>	<p>In a process called <b>respiration</b>, energy is removed from the bonds of molecules (in this case glucose) and stored in the form of <b>ATP</b>. ATP is the energy currency of the cell. Much of the work that takes place in the cell is driven by the hydrolysis of ATP.</p>
<p>Proteins Carbohydrates Fats</p> <p>Amino Acids Sugars Glycerol Fatty Acids</p> <p>GLYCOLYSIS</p> <p>Glucose</p> <p>Glyceraldehyde-P</p> <p>Pyruvate</p> <p>Acetyl CoA</p> <p>Krebs Cycle</p> <p>Electron transport chain and oxidative phosphorylation</p> <p>NH<sub>3</sub></p>	<p>The first stage of respiration is <b>glycolysis</b>. This process involves the splitting of glucose (a six-carbon molecule) to two (three-carbon) <b>pyruvate</b> molecules through a series of 10 enzyme-mediated reactions.</p> <p>Glycolysis takes place in the cytoplasm of the cell and is <b>anaerobic</b>, meaning that oxygen is not required.</p>
<p>in glycolysis 2 ATP are invested 4 ATP are produced</p> <p><b>glucose</b></p> <p><b>pyruvate</b></p> <p>glycolysis (anaerobic)</p> <p><b>aerobic with oxygen</b></p> <p><b>anaerobic without oxygen</b></p> <p><b>CO<sub>2</sub> + H<sub>2</sub>O</b></p> <p><b>lactate or alcohol</b></p> <p>fermentation</p> <p>in aerobic respiration, enough energy is released to produce 36 ATP</p> <p>as more bonds are broken more energy is released</p> <p>many prokaryotes (&amp; O<sub>2</sub> deprived muscle cells) undergo fermentation</p>	<p>After glycolysis, if oxygen is present, pyruvate will be broken down further in the mitochondria to produce CO<sub>2</sub>, H<sub>2</sub>O, and energy.</p> <p>When oxygen is not present, pyruvate will be converted to <b>lactate</b> or <b>ethanol</b> in a process called <b>fermentation</b>.</p>