

ATP

“Adenosine Triphosphate”

The Energy Currency of All Life

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It is known - **Chemical Reactions Sustain Life!** Some are favourable and can be facilitated without additional energy, while others need a source of energy to occur.

To help us explain, let's imagine a dam; water accumulates upstream due to the dam's presence. This water represents potential energy because once released, it can power a turbine that will produce electrical energy. This could represent a favourable chemical reaction, that is, water will go downstream whenever it can. But water does not go upstream, and if we need water to go upstream it needs to be pumped, we need energy to do that, in this we could draw a parallel with an unfavourable chemical reaction that requires energy to allow it to occur. In our world, the most common energy currency is electricity, which can be produced from various sources such as solar, hydroelectric, and fossil fuel combustion etc. Although life uses electricity to transmit information, it doesn't use it as a universal energy

source. All life forms on the planet use the same chemical energy currency, **Adenosine triphosphate (ATP)**.

In keeping with the analogy of electricity production, ATP can be produced by various means, one of which is solar. ATP is produced in plants using solar energy in an organelle called **chloroplast**, while another cell organelle the **mitochondria**, provides the baseload ATP production in plants, animals, and fungi. Other processes in the cell can produce ATP and provide peak load power, the main ones being the phosphocreatine system for extremely fast supply of ATP in the very short term (much like a battery system), and glycolysis for a quick (if inefficient), production of ATP like a gas-fired power station. In this analogy the mitochondria are the nuclear central that provide the baseload and takes longer to adapt. In all cases, ATP is formed by adding a phosphate group to a molecule of **Adenosine Diphosphate (ADP)**.