

Adenosine Triphosphate (Atp)

Encyclopedia Article

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Adenosine Triphosphate (Atp)

Adenosine triphosphate is an organic compound that serves as a source of energy for living organisms, and assists them in carrying out a wide variety of important functions. It is sometimes referred to as the cell's currency of energy exchange. The compound consists of a substituted purine base (6-aminopurine) linked to a five carbon sugar (ribose) that is triply phosphorylated. In activities requiring energy assist, hydrolysis converts ATP to adenosine diphosphate (ADP) and phosphate by removing the terminal phosphate group. Because the total free energy of the products of this chemical reaction (ADP and phosphate) is less than that of ATP, energy is released. The liberated energy can be harnessed and used by living cells. Energy-requiring processes that make use of energy available in ATP include synthesis of proteins, fats, polysaccharides and nucleic acids. ATP is also used to accomplish mechanical work by assisting muscle contraction in animals or the movement of cilia and flagella in microscopic organisms. Many important physiological functions require ATP for osmotic work in which ions or metabolites are transported through membranes against a concentration gradient. Nerve conduction, kidney function, and secretion of hydrochloric acid in the stomach are all examples of processes thus made possible. In plants, photosynthesis is assisted by the conversion of light energy into chemical energy in the form of ATP in a process called photophosphorylation. The ATP is used to drive energy-requiring synthesis of sugars and starch.