



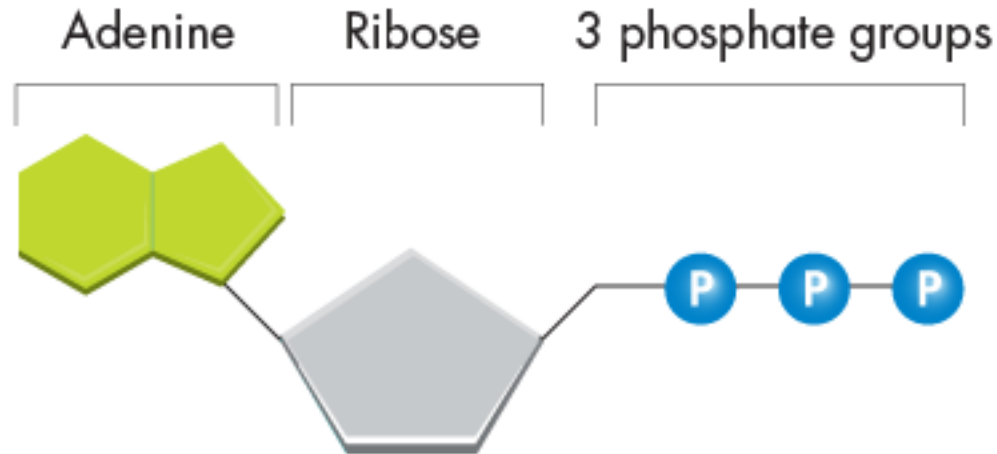
Lesson Overview

9.1 Energy and Life

Chemical Energy and ATP

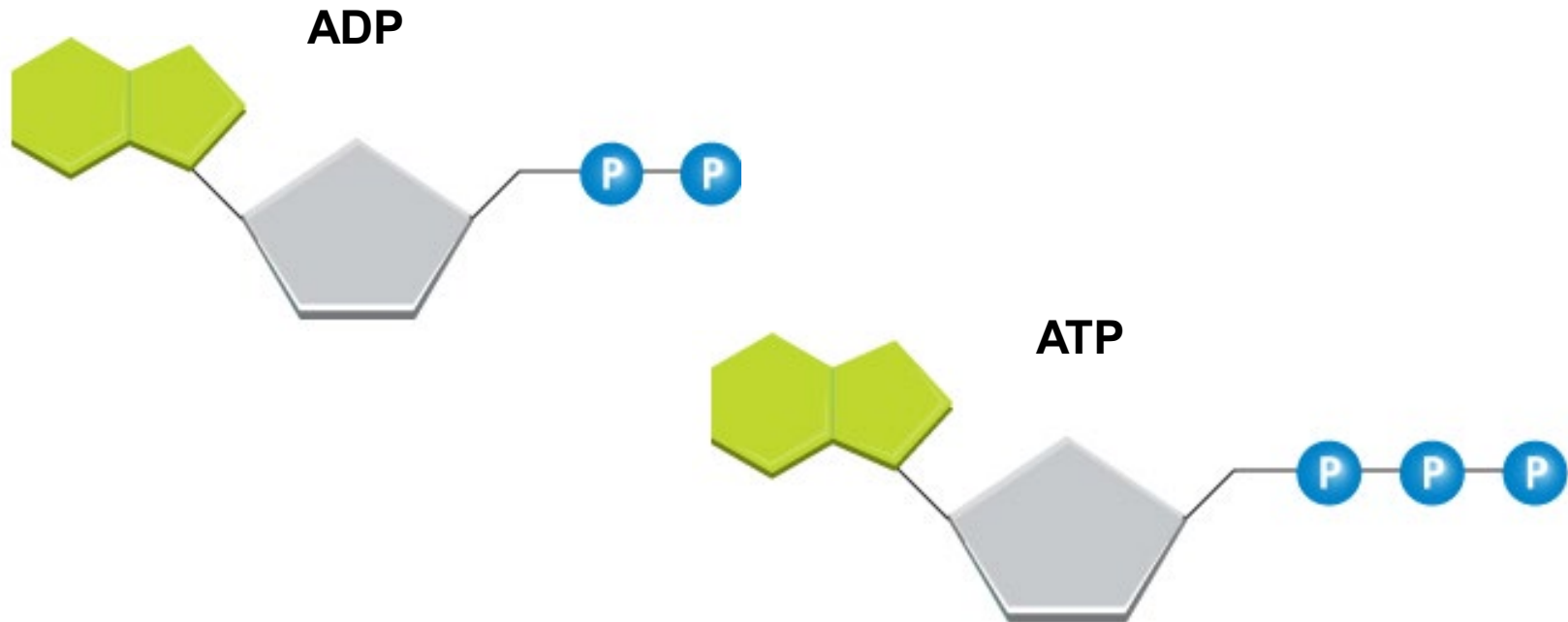
One of the most important compounds that cells use to store and release energy is **adenosine triphosphate (ATP)**.

ATP consists of adenine, a 5-carbon sugar called ribose, and three phosphate groups.



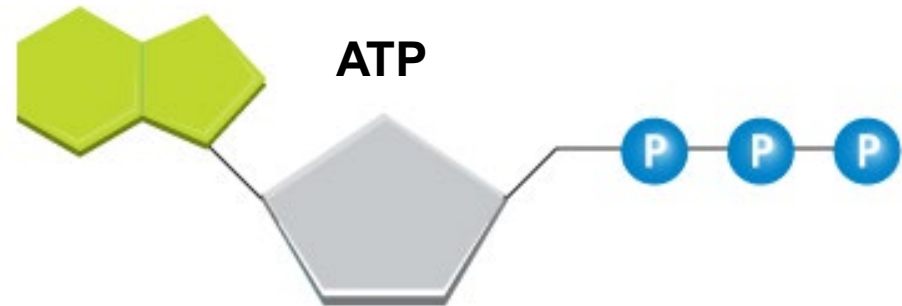
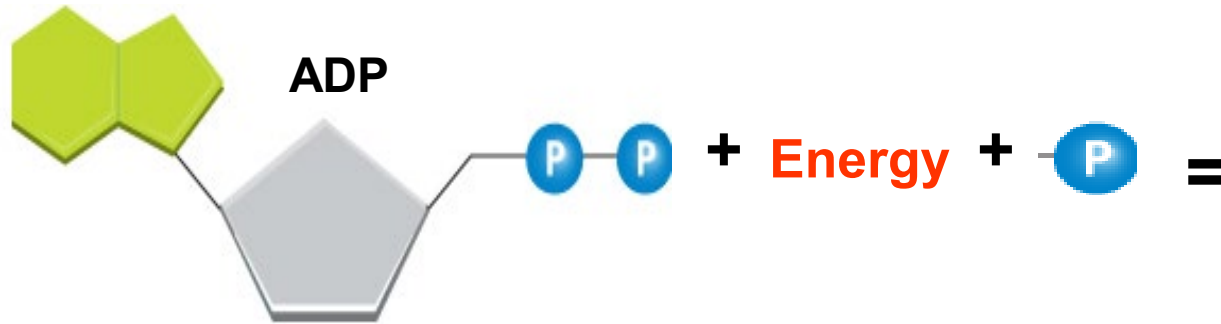
Storing Energy

Adenosine diphosphate (ADP) has two phosphate groups instead of three. ADP contains some energy, but not as much as ATP.



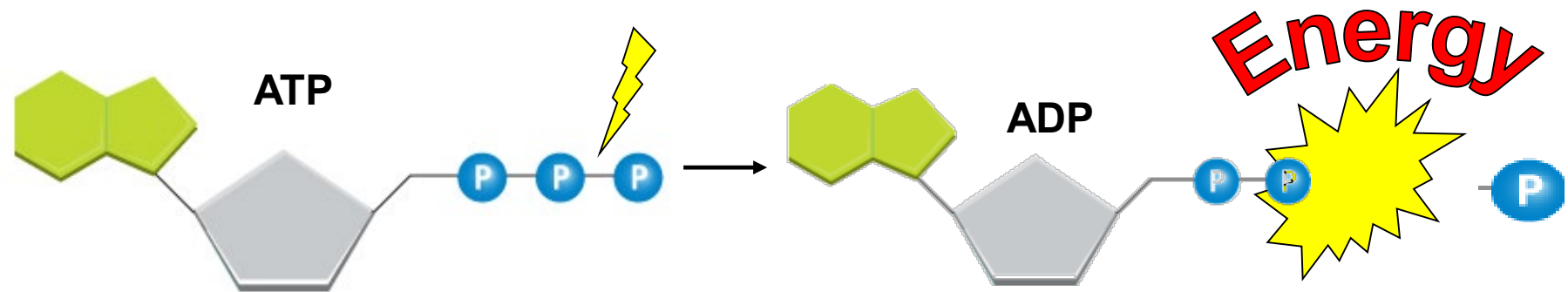
Storing Energy

When a cell has energy available, it can store small amounts of it by adding phosphate groups to ADP, producing ATP.



Releasing Energy

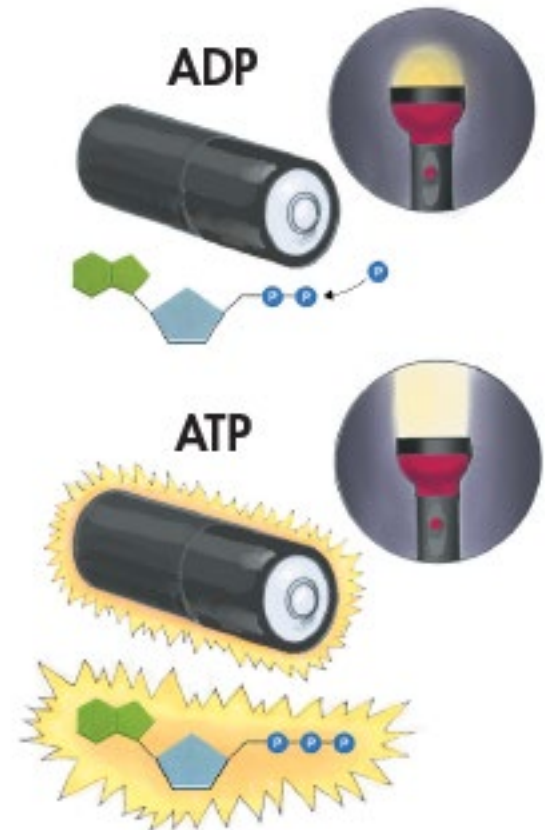
Cells can release the energy stored in ATP by breaking the bonds between the second and third phosphate groups.



Chemical Energy and ATP

Because a cell can add or subtract these phosphate groups, it has an efficient way of storing and releasing energy as needed.

ATP is like a rechargeable battery that powers the machinery of the cell.



Using Biochemical Energy

ATP is not good for storing large amounts of energy for a long time.

It is more efficient for cells to keep only a small supply of ATP on hand.

Cells can regenerate ATP from ADP as needed.

Heterotrophs and Autotrophs

In photosynthesis, plants convert the sun's energy into chemical energy stored in the bonds of carbohydrates.

The energy in carbohydrates is used to make ATP as needed or stored in other molecules.