

8-1 Energy and Life



Living things need energy to survive.

This energy comes from food. The energy in most food comes from the sun.



Where do plants get the energy they need to produce food?

Autotrophs and Heterotrophs



Plants and some other types of organisms are able to use light energy from the sun to produce food.

- Organisms, such as plants, which make their own food, are called **autotrophs**.
- Organisms, such as animals, that must obtain energy from the foods they consume are **heterotrophs**.

Chemical Energy and ATP

Energy comes in many forms including light, heat, and electricity.

Energy can be stored in chemical compounds, too.

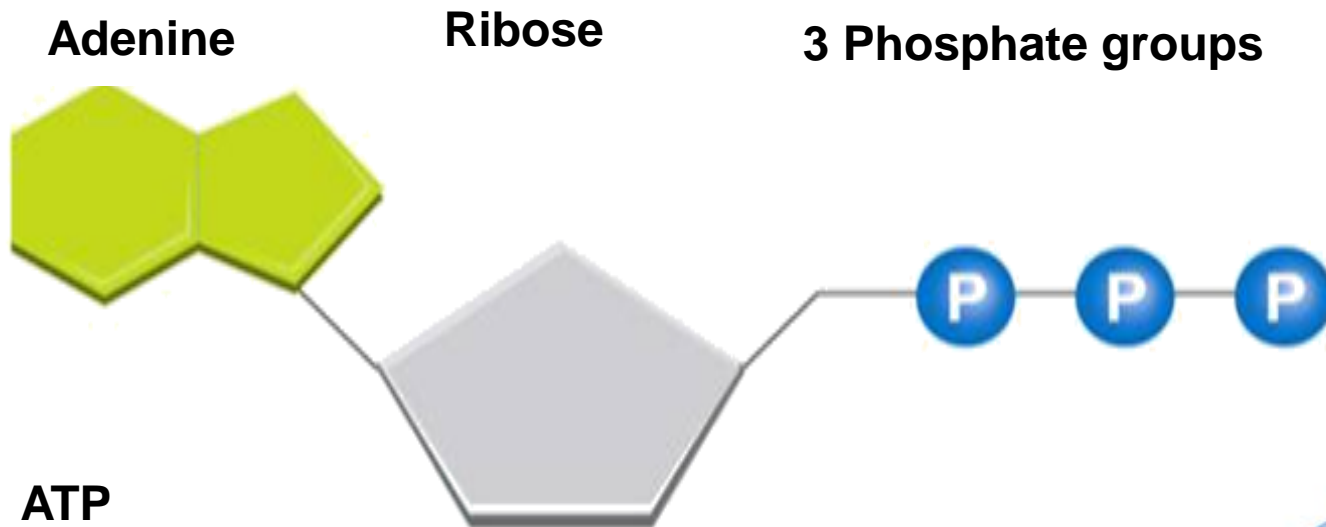


An important chemical compound that cells use to store and release energy is **adenosine triphosphate**, abbreviated **ATP**.

ATP is used by all types of cells as their basic energy source.

ATP consists of:

- adenine
- ribose (a 5-carbon sugar)
- 3 phosphate groups

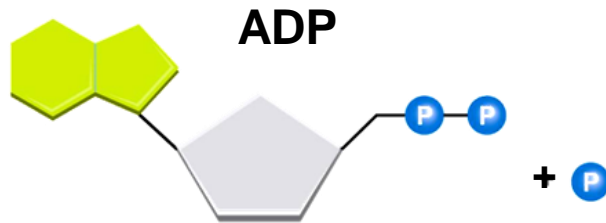


The three phosphate groups are the key to ATP's ability to store and release energy.

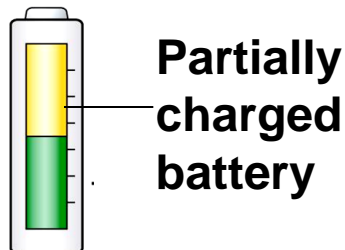
Storing Energy

ADP has two phosphate groups instead of three.

A cell can store small amounts of energy by adding a phosphate group to ADP.

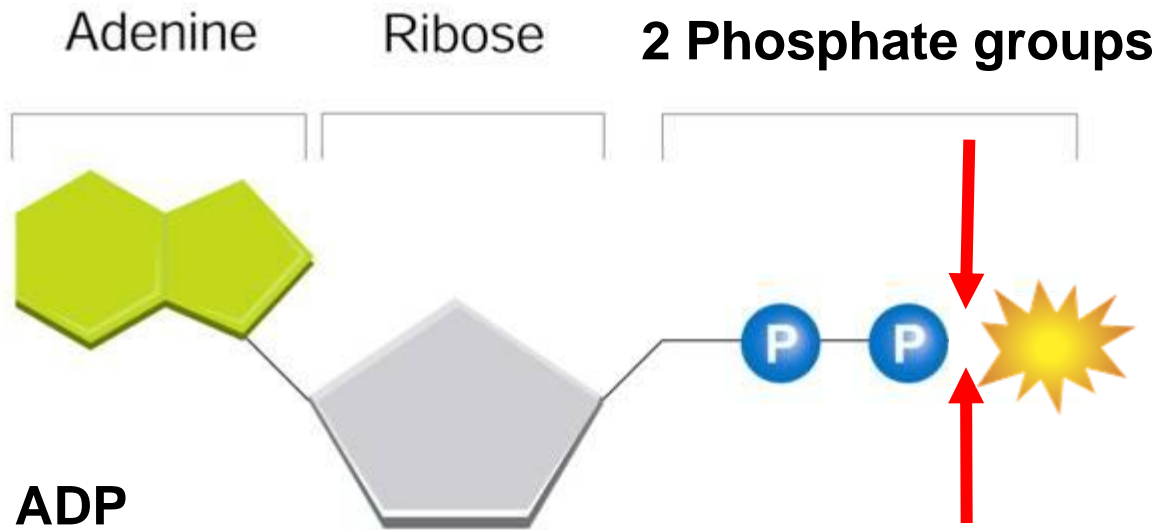


Adenosine Diphosphate
(ADP) + Phosphate



Releasing Energy

Energy stored in ATP is released by breaking the chemical bond between the second and third phosphates.





What is the role of ATP in cellular activities?

The energy from ATP is needed for many cellular activities, including active transport across cell membranes, protein synthesis and muscle contraction.



ATP's characteristics make it exceptionally useful as the basic energy source of all cells.

Using Biochemical Energy

Most cells have only a small amount of ATP, because it is not a good way to store large amounts of energy.

Cells can regenerate ATP from ADP as needed by using the energy in foods like glucose.

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1 Organisms that make their own food are called

- A**
- a. autotrophs.
 - b. heterotrophs.
 - c. decomposers.
 - d. consumers.

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2 Most autotrophs obtain their energy from

a. chemicals in the environment.

A b. sunlight.

c. carbon dioxide in the air.

d. other producers.

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3 How is energy released from ATP?

- a. A phosphate is added.
- b. An adenine is added.

A c. A phosphate is removed.

- d. A ribose is removed.

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4 How is it possible for most cells to function with only a small amount of ATP?

a. Cells do not require ATP for energy.

A b. ATP can be quickly regenerated from ADP and P.

c. Cells use very small amounts of energy.

d. ATP stores large amounts of energy.

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5 Compared to the energy stored in a molecule of glucose, ATP stores

a. much more energy.

A b. much less energy.

c. about the same amount of energy.

d. more energy sometimes and less at others.

END OF SECTION