

# Cellular Respiration

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Printed: November 19, 2014

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CHAPTER

1

# Cellular Respiration

- Define cellular respiration.
- Summarize the significance of ATP.



### Helpful Media

The connection between cellular respiration and photosynthesis:

<https://www.youtube.com/watch?v=0IJMRsTcwgc>

### Vocabulary

TABLE 1.1:

| Word                 | Definition                                    | Used in a sentence (context)  | Example(s) |
|----------------------|---|---|------------|
| Cellular respiration | Breaking down glucose to release energy (ATP) | Cellular respiration is the opposite chemical reaction as photosynthesis. | Breathing  |
| ATP                  | Useable form of energy for living things      | ATP allows living things to make use of energy.                           | figure*    |

IMAGE NOT AVAILABLE

Why do you need food?

The main reason you need to eat is to get energy. Food is your body's only supply of energy. However, this energy must be converted from the apple (or any other food you eat) into an energy source that your body can use. The process of getting energy from your food is called cellular respiration.

## What is Cellular Respiration?

How does the food you eat provide energy? When you need a quick boost of energy, you might reach for an apple or a candy bar. But cells do not "eat" apples or candy bars; these foods need to be broken down so that cells can use them. Through the process of **cellular respiration**, the energy in food is changed into energy that can be used by the body's cells. Initially, the sugars in the food you eat are digested into the simple sugar **glucose**, a **monosaccharide**. Recall that glucose is the sugar produced by the plant during photosynthesis. The glucose, or the **polysaccharide** made from many glucose molecules, such as **starch**, is then passed to the organism that eats the plant. This organism could be you, or it could be the organism that you eat. Either way, it is the glucose molecules that holds the energy.

## ATP

During cellular respiration, glucose is converted into ATP. It is chemical energy the cell can use. It is the molecule that provides energy for your cells to perform work, such as moving your muscles as you walk down the street. Cellular respiration is the reverse reaction of photosynthesis. During cellular respiration, glucose, in the presence of oxygen, is converted into carbon dioxide and water. The process can be summarized as: glucose + oxygen → carbon dioxide + water. During this process, the energy stored in glucose is converted into ATP.

Energy is stored in the bonds between the phosphate groups ( $\text{PO}_4^-$ ) of the ATP molecule. When ATP is broken down into ADP (adenosine diphosphate) and inorganic phosphate, energy is released. When ADP and inorganic phosphate are joined to form ATP, energy is stored. During cellular respiration, about 36-38 ATP molecules are produced for every glucose molecule.

## Summary

Simple cellular respiration equation:



Simple cellular respiration equation (using words):

Glucose + Oxygen →  
Water + Carbon Dioxide + energy

- Through the process of cellular respiration, the energy in food is converted into energy that can be used by the body's cells.
- During cellular respiration, glucose and oxygen are converted into ATP, carbon dioxide, and water.

## Practice

Use the resource below to answer the questions that follow.

- **Define Cellular Respiration** at <http://www.youtube.com/watch?v=Sr9rYgYS1Fc> (1:02)

1. What is cellular respiration?
2. Do plant cells respire?
3. What kinds of molecules are used for cellular respiration? Give specific examples.

## Review

1. What is the purpose of cellular respiration?
2. What is ATP?
3. How much usable energy is extracted from one glucose molecule?