

The Life of a Plant in a Jar: Part 4 Synthesis



Let's check in on our plant-in-a-jar. How's it doing? After **23 days**, the plant still appears healthy and continues to grow.

Last week we left you with some questions about the Earth's atmosphere. Here is one of them that we will explore in this week's inquiry.

How is the atmosphere able to maintain constant concentrations of oxygen and CO₂, even in places where there is very little photosynthesis?

Phytoplankton, very small plants that live in the ocean, are responsible for producing approximately 90% of the Earth's oxygen. That oxygen becomes part of the atmosphere and is dispersed by the wind. Obviously, this is vital to life on earth:

“The global carbon cycle, which regulates the temperature of our planet, and life-sustaining oxygen, essential to the metabolism of all aerobic organisms, is controlled by the actions of the phytoplankton. Perhaps no other group of organisms plays such a major role in the maintenance of life on Earth.”

<http://www.oceansonline.com/phytoplankton.htm>

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Phytoplankton, along with all other plants, play another important role in maintaining life on Earth. Plants **synthesize** chemical substances that provide animals with the energy and nutrients they need to maintain life.

What are examples of chemical substances that plants synthesize?

- *Sugars, starches*
- *Fats (e.g. .avocado, peanut)*
- *Proteins (e.g. peanut, beans)*
- *Vitamins (e.g. vitamin C)*
- *Enzymes and catalysts (e.g. chlorophyll, pigments)*

While most of the compounds that plants synthesize are made from simple compounds containing carbon, hydrogen, and oxygen produced during **photosynthesis**, some of the compounds plants **synthesize** contain metals and other elements such as nitrogen and phosphorous. How does the plant get these raw materials?

Metals are obtained from the soil, absorbed by the roots of the plant. The metals are present in the soil due to the decomposition of inorganic materials. Magnesium is an example of one important metal; it is a component of the chlorophyll that gives green plants their color and ability to photosynthesize.

Nitrogen is trickier. In general, plants can only get nitrogen from the soil, even though it is the most abundant gas present in the air. Before plants can use it, the nitrogen must be "**fixed**" or transferred from the atmosphere to the soil. Much of the nitrogen in the soil is fixed by **nitrogen fixing bacteria**, which convert the nitrogen (a gas, N₂) in air into compounds of nitrogen and oxygen that are soluble in water. Nitrogen is essential to plants' production of proteins (often consumed by animals).

As you can see, many of the materials that plants synthesize are eaten by animals, including humans. You may have noticed that we have not used the word **food**, either to describe what animals obtain from plants or to describe what is produced by plants during photosynthesis. This is because **food** is one of those words that has different definitions, depending upon the context.

We'll explore the intricacies of this seemingly simple word next week...