Photosynthesis and Chemosynthesis

Photosynthesis and chemosynthesis are similar in that they both make glucose. Photosynthesis is the process in which green plants use the sun’s energy to combine carbon dioxide and water to make glucose and oxygen. Chemosynthesis does not require light to make glucose.

In this unit you should learn the following.
1. Explain the process of photosynthesis.
2. Explain the process of chemosynthesis.
3. Identify the similarities and differences between photosynthesis and chemosynthesis.
4. Explain the function of chlorophyll.
5. Describe the energy changes that occur during photosynthesis.
6. Be able to use the following words correctly:
   a. photosynthesis
   b. chemosynthesis
   c. chloroplasts
   d. glucose
   e. carbon dioxide
   f. water
   g. oxygen
Photosynthesis

Photosynthesis is one of the most important processes known to man. Without photosynthesis we would die. Photosynthesis occurs whenever a green plant takes in water and carbon dioxide and uses energy from the sun or other light source, the green plant will make glucose and oxygen. Chloroplasts are the cell part, or organelle, that trap the sun's energy so the plant can use it to make glucose. Photosynthesis could not occur without chloroplasts.

The process where a plant makes glucose and oxygen from water and carbon dioxide, with the help of sunlight or light energy is called photosynthesis. In photosynthesis, the chloroplasts in green plants convert light energy into the chemical energy of glucose. Only green plants and certain bacteria that contain chloroplasts can perform photosynthesis. Animals do not possess chloroplasts and cannot perform photosynthesis.

Since animals cannot perform photosynthesis, they must consume plants or other animals to gain their source of certain foods.

Equation for Photosynthesis

\[ 12H_2O + 6CO_2 + \text{light} \rightarrow C_6H_{12}O_6 \text{ (glucose)} + 6O_2 \]
REMEMBER THIS !!!
Green plants make glucose and oxygen from water and carbon dioxide with the help of light as an energy source (photosynthesis).

Interesting Scientific Fact: The oxygen made in photosynthesis is actually a waste product for green plants. Animals, including you, are dependent upon green plants to continually make more oxygen for us to breathe.

Question 1. During photosynthesis, explain the form energy starts out as, and the form it is turned into.

Question 2. How would you explain photosynthesis to someone?

Question 3. What is needed for photosynthesis to occur?

Question 4. What are the products given off by photosynthesis?

Question 5. What is the function of chloroplasts? What do they make?

Chemosynthesis
The process where glucose is made without light as an energy source is called chemosynthesis. This process is not nearly as important as photosynthesis, but they are both similar. In both cases, glucose is created. In chemosynthesis, inorganic compounds are used by certain bacteria and non-green plants to make glucose.

Interesting Scientific Fact: Until recently, scientists could not understand why certain bacteria and non-green plants could survive in areas that received no light. It is now known that these organisms can create their own glucose by joining several energy-rich inorganic compounds, such as sulfur, together to create glucose. Deep seas organisms that live close to hydrothermal volcanic vent commonly use the sulfur that is ejected from the volcanic vents.
**Summary**

*Photosynthesis and Chemosynthesis (3134, 3136)*

"Photo" means light. "Synthesis" means to put together. Photosynthesis is the process of putting together a very important molecule using the energy of light. The very important molecule is called **glucose**. As you remember, glucose is a simple carbohydrate. Glucose is important because it not only provides living things with energy, but it also can be used to build other molecules that living things need.

Only green plants, algae, and some bacteria can carry out the process of photosynthesis. Photosynthesis can only occur in cells that contain **chloroplasts**. Chlorophyll traps the sun's energy. Then **carbon dioxide** enters a plant through its leaves. Water enters a plant through its roots. The energy trapped by chloroplasts rearranges the carbon dioxide and water molecules into glucose. Photosynthesis also produces oxygen which is a waste product for plants.

Photosynthesis is extremely important to life, because not only do plants need it, animals do too. Animals must eat plants or other animals that have eaten plants to obtain the energy and nutrients they need. Also, the oxygen we breathe was created by a green plant as a waste product of photosynthesis.

Deep underwater there is no light. How do living things survive? Chemosynthesis is a process like photosynthesis in that they both create glucose. Chemosynthesis is able to do it without the presence of light. Chemosynthesis often occurs deep in the ocean. In both processes, glucose is made. However, in chemosynthesis, the energy needed to build glucose doesn't come from the sun, it comes from the stored energy of inorganic compounds, like sulfur, coming from inside of the Earth through cracks in the sea floor.
Matching

_____ 1. photosynthesis  a. a simple carbohydrate made during photosynthesis and chemosynthesis  
_____ 2. chemosynthesis  b. along with water, this compound is needed to make glucose  
_____ 3. chloroplasts  c. carbon dioxide and this molecule combine to make glucose  
_____ 4. glucose  d. this waste product of photosynthesis is needed by animals  
_____ 5. oxygen  e. putting together glucose using the energy stored in inorganic compounds.  
_____ 6. water  f. putting together glucose using light energy.  
_____ 7. carbon dioxide  g. organelle (cell part) in plants needed to trap light energy for photosynthesis.

True or False

_____ 1. Photosynthesis means putting together glucose using light.  
_____ 2. Chemosynthesis means putting together glucose using light.  
_____ 3. The glucose made in photosynthesis and chemosynthesis is identical.  
_____ 4. Chloroplasts are red.  
_____ 5. Chloroplasts are green.  
_____ 6. Photosynthesis occurs in plants.  
_____ 7. Photosynthesis occurs in animals.  
_____ 8. Photosynthesis occurs in algae.  
_____ 11. Chemosynthesis needs light to occur.  
_____ 12. Animals could not survive without photosynthesis to make their food.  
_____ 13. Plants could not survive without photosynthesis.  
_____ 15. Chemosynthesis occurs only in shallow water.

Fill in the Blank
photosynthesis  light  chloroplast  food  some bacteria
carbon dioxide  water  glucose  animals
chemosynthesis  algae  plants  oxygen

1. __________________ cannot make their own food.
2. __________________, __________________, and __________________ can make their own food using the process called ___________________.
3. The end products of photosynthesis are _________________ and ________________.
4. The cell part, ________________ , traps the sun's ______________ energy.
5. This trapped energy is used to link together six __________________ molecules and six ______________ molecules to make one glucose molecule.
6. Rice, corn, steak, and chicken are all types of ____________ made directly or indirectly by photosynthesis.
7. __________________ is the process of making glucose without light, using the energy stored in molecules made inside Earth.

**Answer the Following**

1. What is made from photosynthesis and chemosynthesis?

2. What are two things plants can do with glucose?

3. What organisms can carry out photosynthesis?

4. What cell part do these organisms have?

5. Write a statement or equation that explains photosynthesis.

6. What is chemosynthesis?

7. Compare and contrast photosynthesis and chemosynthesis.
Question 1. During photosynthesis, explain the form energy starts out as, and the form it is turned into.

Question 2. How would you explain what happens in photosynthesis to someone?

Question 3. What are the starting reactants needed for photosynthesis to occur?

Question 4. What are the products given off by photosynthesis?

Question 5. What is the function of chloroplasts? What do they make?

Question 6. Explain chemosynthesis in your own words.

Question 7. List the similarities and differences between photosynthesis and chemosynthesis.