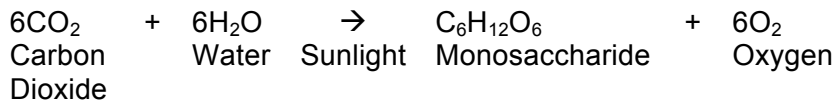


## Photosynthesis Lab

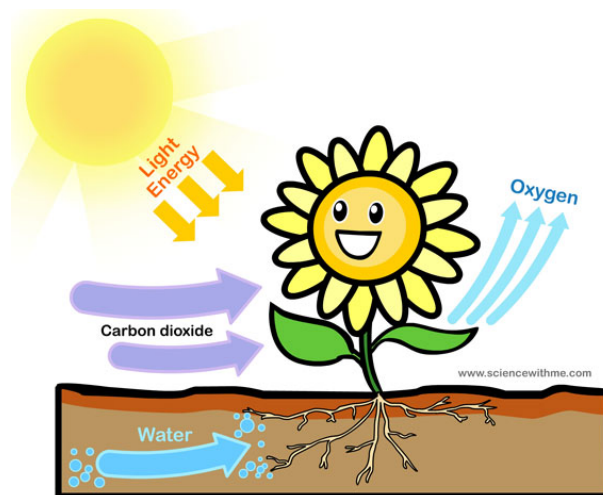
Photosynthesis is how organisms such as plants, algae, and some bacteria create energy using sunlight. The overall equation for photosynthesis is shown below:



Most land plants take in  $\text{CO}_2$  from the atmosphere through their leaves and  $\text{H}_2\text{O}$  through their roots. Aquatic plants can take in both  $\text{CO}_2$  and  $\text{H}_2\text{O}$  through their leaves. Land plants, aquatic plants and algae have a cell organelle called chloroplast.

Chloroplasts contain an energy absorbing pigment called chlorophyll. Chlorophyll is the pigment that makes plants green because it absorbs all the different spectrums of light except green. The energy in sunlight absorbed by chlorophyll is used to convert the  $\text{CO}_2$  and  $\text{H}_2\text{O}$  into simple sugars ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) such as glucose.  $\text{O}_2$  is also produced in this reaction.





The simple sugars produced through photosynthesis are used by the plant as an energy source. Excess sugars are stored as disaccharides such as sucrose and polysaccharides such as starch. Animals are able to extract the energy stored in these carbohydrates through a process called respiration.



## Photosynthesis Lab

The following lab activity will demonstrate photosynthesis. 4 large test tubes will be filled with a solution of phenol red, a chemical indicator that changes to bright yellow when acids are present (pH levels below 7) and magenta when bases are present (pH levels above 7). One lab member will blow bubbles through a straw into two of the test tubes. The  $\text{CO}_2$  in the person's breath will form an acid with the water in the phenol red solution, lowering the pH. The phenol red will turn yellow.

A strand of a common aquatic plant found in pet stores (such as elodea) will be placed into one of the reacted phenol red tubes (yellow solution) and into one of the unreacted phenol red tubes (red solution). All the tubes will be sealed with a rubber stopper, and placed outside in the sun. After 15-30 minutes, the tubes will be collected and observations recorded. Observations will also be collected from an additional set of tubes set up by your instructor and kept in a completely dark area.

Unreacted phenol red + aquatic plant	Reacted phenol red + aquatic plant	Unreacted phenol red	Reacted phenol red
			
Solution is Red	Solution is Yellow	Solution is Red	Solution is Yellow

## Photosynthesis Lab Worksheet

### ***Pre-lab Questions***

- 1) Why must someone blow bubbles into the phenol red? Why are aquatic plants placed in both the reacted and unreacted phenol red solutions?
  
  
  
  
  
  
  
  
  
  
- 2) What is the purpose of both the reacted and unreacted phenol red solutions without any aquatic plant in it?
  
  
  
  
  
  
  
  
  
  
- 3) Why is the experiment done twice, once in sunlight (your experiment) and once in darkness (Teacher's demo)?
  
  
  
  
  
  
  
  
  
  
- 4) What do you predict will happen? Record your predictions in the chart below:

	Unreacted phenol red + aquatic plant	Reacted phenol red + aquatic plant	Unreacted phenol red	Reacted phenol red
Sunlight				
Darkness				

### ***Post-lab Questions***

#### **Data**

	Unreacted phenol red + aquatic plant	Reacted phenol red + aquatic plant	Unreacted phenol red	Reacted phenol red + aquatic plant
Sunlight				
Darkness				

#### **Conclusion**

Explain why the above results were obtained using the CLAIM, EVIDENCE, REASONING method.