May 21, 2018

8th Photosynthesis Review

***Vocab***

* **Photosynthesis**: the process by which plants, algae, and some bacteria convert light energy into chemical energy for growth
	+ Plants use the light energy from photons, carbon dioxide from the air, and water from the soul to produce oxygen and the sugar glucose
	+ **6CO2 + 6H2O 🡪 C6H12O6 + 6O2**
* **Glucose**: a sugar produced by plants during photosynthesis
	+ C6H12O6
	+ Hundreds of glucose molecules bind together to form large *starch* molecules
	+ *Starch is a form of stored chemical energy*
* **Photons**: particles of light energy
	+ Photons from nuclear fusion in the center of the sun provide energy for photosynthesis
* **Chloroplast**: organelles found in the cytoplasm of plant cells which are responsible for photosynthesis
	+ Located in both the leaves and stems of plants
* **Chlorophyll**: a green pigment concentrated in the chloroplasts of plant cells
	+ Chlorophyll is necessary for photosynthesis
	+ Chlorophyll absorbs mostly red and blue/violet wavelengths
* **Carotene**: a yellow pigment in plants
	+ Carotene is present in plants all summer, but the yellow color is masked by huge amounts of chlorophyll
	+ Protects plant cells from harmful photosynthesis byproducts
* **Anthocyanin**: a red/orange pigment in plants
	+ Produced in stems and flowers
	+ Produced mostly in autumn
* **Carbon dioxide:** a gas that is necessary for photosynthetic reactions (CO2)
	+ Most of a plant’s mass comes from carbon, which is harvested from the carbon dioxide plants take in
	+ Adding carbon dioxide to water produces carbonic acid, which makes water more acidic
		- Testing the pH of water can help us tell whether there is carbon dioxide being produced by plants in the water
* **Oxygen:** a gas that is a product of photosynthetic reactions and is necessary for the life of animals and other living organisms (O2)
	+ Plants are the main source of oxygen on Earth
* **Absorption spectrum**: the types of wavelengths that a substance is able to absorb
	+ Ex. the absorption spectrum of chlorophyll shows that chlorophyll absorbs red and blue/violet wavelengths readily, but reflects yellow and green wavelengths
* **pH:** a property of matter which describes whether a substance is acidic or basic.
	+ A pH of 7 indicates a neutral substance
	+ A pH lower than 7 indicates that the substance has acidic properties
	+ A pH greater than 7 indicates that the substance has basic properties

***Focus Questions***

* **What do plants need to live?**
	+ Plants need water, sunlight, and carbon dioxide.
* **Which pigments or colors are present in spinach leaves? *Investigation #1***
	+ The leaves contain yellow and yellow-green pigments.
* **How do light and photosynthesis affect carbon dioxide levels? *Investigation #2***
	+ In the presence of light, *carbon dioxide levels decreased* in water containing Elodea but not in water alone. This is because the presence of light increased the ability of Elodea to perform photosynthesis, so the *Elodea consumed more carbon dioxide*.
* **How do light and photosynthesis affect oxygen levels? *Investigation #2***
	+ In the presence of light, *oxygen levels increased* in water containing Elodea but not in water alone. This is because the presence of light increased the ability of Elodea to perform photosynthesis, so the *Elodea produced more oxygen* and released it into the water.
* **What is the importance of light in photosynthesis? *Investigation #2***
	+ Light is necessary for photosynthesis to take place.
* **In which parts of the plant does photosynthesis occur? *Investigation #3***
	+ Both the Elodea stem and the Elodea leaf contain chloroplasts; therefore, photosynthesis occurs in both the stem and the leaf.
* **In which parts of a Coleus leaf does photosynthesis occur? *Investigation #4***
	+ Photosynthesis takes place in the chloroplasts, which are the parts of the leaves which contain chlorophyll. This is often indicated by the green color of the chlorophyll.
* **Which pigment is required for photosynthesis?**
	+ The green pigment chlorophyll is required for photosynthesis.
* **Why do leaves change color in the fall?**
	+ As the length of nighttime increases and the days shorten, chlorophyll production slows down and eventually stops.
	+ Chlorophyll eventually disappears from leaves, and the yellow carotene can be seen more clearly.
	+ As chlorophyll production decreases, anthocyanin production *increases*, causing leaves to turn red.
		- The amount of anthocyanin produced depends on the weather and soil moisture.
		- Good weather and water conditions lead to bright, vibrant reds
		- Poor weather and water conditions lead to duller, less vibrant reds
			* This partially explains why not all autumn leaves have the same mix of colors
* **How does energy from the sun fuel photosynthetic processes on Earth?**
	+ Nuclear fusion in the center of the sun releases energy in the form of photons.
	+ Photons reach the surface of the sun and travel approximately 8 minutes to Earth.
	+ On Earth, photons strike plant cells and cause photosynthesis to occur.
		- Plants convert the photon’s energy into stored chemical energy in the form of glucose
	+ Glucose is stored and later used by the plant to grow and reproduce.