

Name: _____

Period: _____

Thymol Blue Lab

Objective: the purpose of this lab activity is to observe the effects of cellular respiration on an indicator called thymol blue.

Thymol blue is an indicator which changes color in the presence of carbon dioxide

Background:

To maintain life, the trillions of cells that make up the human body must constantly use energy. This energy is obtained through a process called respiration. Using respiration, oxygen provided by the respiratory system is taken in by our cells and used to change the chemical energy found in a molecule of sugar (glucose) into an energy form that is usable for humans.



Through this process a waste product called carbon dioxide is created. If carbon dioxide builds up in the body it can be fatal to humans. Therefore, we must have a way to get rid of it. This is accomplished by breathing air out of the lungs when we exhale. Using thymol blue, an indicator that turns yellow in the presence of carbon dioxide, you can detect the presence of carbon dioxide in the breath you exhale.

Pre-Lab Questions:

1. What goes INTO the reaction (reactants) that transforms food into energy within our cells?

Circle all that apply

- a. Carbon dioxide
- b. Water
- c. Oxygen
- d. Energy (ATP)
- e. Sugars (glucose)

2. What is PRODUCED (products) by the reaction that transforms food into energy within our cells? **Circle all that apply**

- a. Carbon dioxide
- b. Water
- c. Oxygen
- d. Energy (ATP)
- e. Sugars (glucose)

3. What is the **main purpose** of cellular respiration?

Procedure:

1. Select one person from your group to participate in the lab activity.
2. Write your observations of the color of the liquid in the two tubes in the table below.
3. Take a drinking straw, place it into one of the solutions and gently blow bubbles into the solution for one minute.
You must wear safety goggles at all times during this activity. You must only breathe out through the straw. DO NOT inhale any of the solution.
4. Record your data in the table below.

Data table:

	Color of solution	Color of control solution
Initial observation		
After bubbling for 1 minute		X

Analysis:

1. After you blew bubbles through the solution, the color changed. The color change indicates the presence of a new substance. What substance did you add that changed the color of the solution?
2. What process created the substance in question #1?
3. Where in the cells does this process take place?
4. Why do plants need to go through **both** photosynthesis and respiration?

Fill in the table below:

	Photosynthesis	Cellular Respiration
Organelle for process		
Reactants	$\text{CO}_2 + \text{H}_2\text{O}$	
Products		

Cell energy review:

A. Mitochondria B. Chloroplast C. Cellular respiration

D. Photosynthesis E. Energy F. ATP G. Glucose H. Food

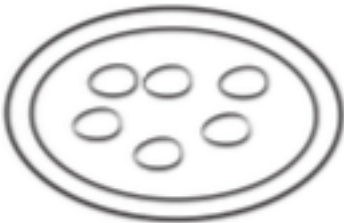

Directions: Match the statements below with the appropriate term. Write the letter in the space provided.

- _____1. The process in which glucose is broken down and ATP is made
- _____2. The ability to do work
- _____3. Stored chemical energy; sugar
- _____4. The energy-carrying molecule that cells use for energy
- _____5. Process that stores energy from sunlight into the chemical bonds of glucose
- _____6. Molecules that store energy in their chemical bonds
- _____7. The site of photosynthesis
- _____8. The site of cellular respiration

Directions: Write T if the statement below is true and F if the statement is false in the space provided.

- _____9. All life needs energy.
- _____10. The chemical formula for glucose is $C_6O_{12}H_6$.
- _____11. Many scientists consider photosynthesis to be the most important life process on Earth.
- _____12. Plants, algae, and some bacteria can make their own food through photosynthesis.
- _____13. Photosynthesis occurs in both plants and animals.
- _____14. Cellular respiration occurs in animal cells but not in plant cells.
- _____15. Because you are able to cook your own food in a microwave oven, you are a producer.
- _____16. Photosynthetic organisms are also known as heterotrophs.
- _____18. Glucose is changed into ATP in the process of photosynthesis.

Directions: Complete the chart below. Write your answers in the spaces provided.

Organelle structure	 A diagram of a chloroplast, showing an oval outer membrane and a double inner membrane. Inside, there are several small circular grana.	 A diagram of a mitochondrion, showing an oval outer membrane and a highly folded inner membrane forming cristae.
Name of organelle		
Process of the organelle		
Type of cell found in (plant/animal)		