



Cellular Respiration

Activity

Cellular respiration, like photosynthesis, involves a series of chemical reactions used to transform energy inside cells. Both consumers and producers use cellular respiration to release energy from food and then store it in a more usable form. Molecules of glucose are broken down and the energy from within the chemical bonds of glucose is used to make ATP. The remaining carbon and hydrogen atoms bind with oxygen to form carbon dioxide (CO_2) and water (H_2O).

You should remember about chemical reactions from earlier science classes. One thing you learned was the kind of evidence that tells you a chemical reaction has occurred. One piece of evidence is a color change. Today we will be using what is called an indicator. An indicator is a chemical that changes color when a chemical reaction has happened. The indicator today is called bromothymol blue. It is blue in the presence of a base, and yellow-green in the presence of an acid.

You know that we breathe in oxygen and breathe out carbon dioxide. When we breathe carbon dioxide into water, the water becomes slightly acidic with an acid called carbonic acid. The more carbon dioxide, the more carbonic acid, and the yellower the bromothymol blue indicator.

Procedure

Part I:

1. Put your safety goggles on.
2. Using a pipette, add approximately five mL of water to all of the test tubes.
3. Add ten drops of bromothymol blue to each tube and tap each tube to gently mix.
4. Give each student in your group a straw and a paper towel.
5. Place the straw in the test tube and wrap the paper towel around the top of the test tube and straw.
6. Gently blow air through the straw into the bottom of the test tube.
7. When the solution changes color to yellow or greenish, stop blowing.



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Part II:

1. Choose a person in your group to be the exerciser.
2. Choose a person in your group who will be the timer.
3. Number the test tubes one through three and set them up using a pipette to add approximately five mL of water to each test tube. Then add ten drops of bromothymol blue to each tube and tap each tube to gently mix.
4. Have the exerciser put his or her safety goggles on and start the timer. Have the exerciser blow into test tube one. When the solution changes, note the time in the data table on the next page.
5. Place the time in the chart on the next page.
6. Next, the exerciser will jog in place for one minute.
7. After a minute, and while being timed, have the exerciser slowly blow air through the straw into test tube two.
8. Record how long the color change took. Record in the data table.
9. Choose a different exercise that you think takes more energy than jogging in place for one minute.
10. Have the exerciser perform this exercise for one minute.
11. After a minute, and while being timed, have the exerciser slowly blow air through the straw into test tube three.



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	Test Tube 1	Test Tube 2	Test Tube 3
Time			

1. What happened to the color of the water/bromothymol blue solution after you blew into it?

2. What is the color change evidence of?

3. What is the effect of exercise on carbon dioxide production?

4. Why does this happen?

5. What is cellular respiration?

6. Why is cellular respiration important to both plants and animals?
