

	<h2 style="margin: 0;">Acid- Base Indicators: The Effects of Exercise on Respiration</h2>	TOTTEN SCIENCE
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LAB PREVIEW

1. What is breathing? _____

2. What is respiration? _____

3. What substances are involved in respiration?

BACKGROUND INFORMATION

Breathing rate increases with an increase of **physical activity**. **Bromothymol blue** is an indicator for carbon dioxide which means that it will change color if it is present. When carbon dioxide is in the presence of water, carbonic acid is formed. Carbonic acid is a weak acid that is created when carbon dioxide (CO₂) is dissolved in water (H₂O), resulting in the chemical formula H₂CO₃. When the acid dissociates, or gives up a hydrogen ion, the resulting molecule is called a bicarbonate ion . Carbonic acid appears frequently in the natural world. It can be found in sodas, champagne, and blood. The acid even appears in rain.

Bromothymol blue solution changes color from blue to green or from blue to yellow when carbon dioxide is bubbled into it. Can you predict whether there will be a difference in the time it takes for the solution to change color before and after exercise?

Question: Does exercise effect the amount of carbon dioxide exhaled in respiration?

Hypothesis:

MATERIALS

- clock
- drinking straws
- **bromothymol blue** solution
- 150 mL beakers (2)
- graduated cylinder

PROCEDURE

1. At each lab station you will find 2 beakers. Fill each beaker with 50 mL of water
2. Add 15 drops of Bromothymol blue indicator solution.
3. Assign one person to be the timer, and one person to perform the experiment.
4. Using a straw blow into the bromthymol **blue** solution until you see the color change from **blue** to green or yellow. **Be careful not to inhale the solution!**
5. Have your partner time how long it takes for the solution to change color.
6. Write down the time it took for the color change in the observation table below.
7. Now run in place for 1 minute. You should feel a little winded when you are finished
8. Using the same straw **but the 2nd beaker**, blow into the solution and see how long it takes for the solution to change from **blue** to green or yellow.
9. Write down the time it took for the color change in the observation table below.

OBSERVATION TABLE

Beaker	Time for Color Change	New Color Observed
Beaker 1		
Beaker 2		

Analysis of your observations and data. Remember to mathematically examine the relationship between your results.

Conclusion and Discussion

Answer all questions below

1. What is the function of the respiratory system? _____

2. What caused the **bromothymol blue** solution to change color? _____

3. Compare the time it took the **bromothymol blue** solution to change color before exercise and after exercise. _____

4. Explain the differences in question #3 _____

5. What is the manipulated variable or the factor purposely changed to test your hypothesis? _____

6. Look at your observation table and make a graph of your results. Don't forget a title and to label the X and Y axis. Also remember to have equal spacing between numbers that go in order. No skipping #'s with a symbol. **Remember to label the X and Y axis.** We will collect and use class data
7. Using your graph, estimate the time of color change if the time of your **physical activity** were twice as long. _____

8. Where and under what conditions in the body can carbonic acid accumulate? How will the body be impacted?

