

Human Respiration

Purpose:

To investigate human respiration and observe its relationship to physical activity.

Materials: per pair

Straw	250 ml Erlenmeyer flask	Dropper bottle of NaOH	Parafilm
Bromothymol Blue	Graduated cylinder	Timer	

Procedure:

1. Respond to the following question:
 - a. Explain what you think respiration means?
2. In this activity we will observe and measure the results of activity on respiration.
3. Write a hypothesis that reflects what you think will happen to respiration as physical activity increases.
4. Choose one person to be the subject and one person to be the experimenter and 1 person to be the recorder.
5. The subject will be tested under 3 conditions: Mild-walking, Moderate- Speed walking, and Vigorous-Jumping Jacks.
 - a. In what order would you perform these activities? Why?
6. Determine the independent variable and the dependent variable, list them.
 - a. dependent—
 - b. independent—
7. Each activity will be carried out for 2 minutes.
8. You will need a baseline control for the individual doing the activities, what would the control be for this test?
9. Create a data table to record your results. **You will measure drops of NaOH added and breaths per minute.**

10. For your tests, measure 100 ml of Bromothymol Blue Solution (BTB) and pour it into the 250 ml flask. Place the straw into the solution so that the bottom is in the BTB.
11. Lay a piece of parafilm (with several holes) over the e flask.
12. For one minute, blow gently and consistently into the solution. WHEN YOU NEED TO TAKE A BREATH, BE SURE TO REMOVE YOUR MOUTH FROM THE STRAW. DO NOT SWALLOW ANY OF THE SOLUTION.)
13. Count the number of breaths the subject takes during this minute.
14. What color did the solution turn?

15. When you are finished blowing, add NaOH solution to the flask (counting each drop) until the solution turns back to its original color. Record the number of drops that you added in your data table. Repeat for all levels of activity using new Bromothymol Blue.
16. Graph data and compare with at least two other groups.

Discussion Questions

1. What happened to your breathing rate as activity increased?

2. What were you bubbling into the BTB solution? To what color did it change?

3. After bubbling where would the solution fall on the pH scale?

4. What is the relationship between levels of activity and the amount of CO₂ produced?

5. Explain why you think this in terms of the energy needs of your cells.

6. From what material does the CO₂ originate in our bodies?

7. What is the process called that transfers energy in our cells? Write its balanced equation.
8. What element is needed for this process? Relate this to your breathing rates among the different levels of activities.
9. Compare this process to the burning of a log in a fireplace. How is it similar and how is it different?