### Cellular Respiration Lab

## Introduction

You will soon learn that cellular respiration is process in which a cell breaks down sugar or other organic compounds to release energy used for cellular work. In this lab, you will be focusing on the relationship between cellular respiration and exercise (using muscles to perform aerobic activities). You have also used indicators before during the food lab. During this activity you will be using another indicator: **bromothymol blue.** This indicator will turn yellow in the presence of CO2.

**Materials (per group of two)**

* 4 conical tubes
* Test tube rack
* Straw
* Timer- students’ phones
* Weigh boat
* Bromothymol blue (BTB)

**Procedure**

1. With your partner, decide who will be the participant and who will be the timer/data recorder.

2. Pour 10 mL of bromothymol blue solution into the three conical tubes.

3. Have the participant gently blow into one tube until the indicator turns yellow. **Record the amount of time it takes for indicator to change color. NOTE: Do not blow bubbles, but instead blow gently at the surface of the solution.**

4. Write hypothesis, indicating who the participant is and what you think will happen to the time it takes for the indicator to change color after the participant exercises. **HYPOTHESIS –** If \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ exercises for 3 minutes, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. The participant now must perform an aerobic exercise for 3 minutes (i.e. jumping jacks, running up/down stairs, push ups, etc.) while partner times using cell phone timer.

5. Immediately after exercising, take the second test tube and have the participant blow gently until the indicator turns yellow.

**At the same time, a non-exercised participant should blow on the third tube containing 10 mL of BTB. Record the amount of time it takes for indicators of both participants to change color.**

6. Compare the two times that you and your partner recorded with two other groups and record in table.

7. Calculate the average times for each trial (without exercise and after exercising).

8. Now make sure two of the solutions that turned yellow are of the same color (blow air until).

9. Then, pour one into the weigh boat and leave the other in the tube.

**TABLE**

|  |  |  |  |
| --- | --- | --- | --- |
| Group | **Time (seconds)  *Without exercising*** | Time (seconds)  *After exercising* | Partner’s time (seconds) *Without exercising* |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| **Average** |  |  |  |

.

**Analysis/Results**

1. How did exercise affect the amount of time for the indicator to change color?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Describe the relationship between exercise and CO2 production.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Was your hypothesis supported or rejected? Explain.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What were you breathing in vs. breathing out? How did the rate of intake change when you began exercising? Rate of exhaling?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Explain why steps 8 and 9 were completed and what you believe would happen as a result.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What would be a positive and negative control for this experiment?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Cellular Respiration Equation:**