

Name: _____

Block: _____

Date: _____

Cellular Respiration Lab

Purpose

Life needs energy! Our cells (our bodies) need energy to function and to be, simply, alive. Recall that cellular respiration and photosynthesis are two processes that allow plants and animals to live. Plants can make their own food (glucose) and make oxygen using the energy from the sun. This is photosynthesis. Animals and plants have to break down molecules like glucose to make ATP, which cells can use for energy. This is cellular respiration, which uses oxygen and glucose, and makes carbon dioxide.

Bromothymol blue is an *indicator* for pH. When no carbon dioxide (CO₂) is present, the pH is high and bromothymol blue is blue. When carbon dioxide (CO₂) is present, the pH is low, and bromothymol blue is yellow.

Lab – Cellular Respiration: During cellular respiration, animals (and plants) convert oxygen and glucose into energy, carbon dioxide, and water. As you produce more and more energy when doing things like running or exercise, you release MORE carbon dioxide. In this lab, you will test three different conditions: rest, exercising for 30 seconds, and exercising for 2 minutes. Then, you will time how long it will take you to change bromothymol blue to yellow. What do you expect will happen?

Reactions:

Photosynthesis: carbon dioxide + water $\xrightarrow{\text{sunlight}}$ glucose + oxygen

Cellular respiration: glucose + oxygen \longrightarrow ATP + carbon dioxide + water

Pre-Lab Questions

1. What does bromothymol blue indicate?
2. What does it mean when the solution is blue?
3. What does it mean when the solution is yellow?
4. What gas is used during cellular respiration?
5. What gas is made during cellular respiration?
6. What gas is used during photosynthesis?
7. What gas is made during photosynthesis?
8. During exercise, do you think you exhale (breathe out) more or less carbon dioxide than when at rest? Why?

List of Materials

- 3 Labeled beakers
 1. (Rest) *Cellular Respiration* Rest
 2. (30s) *Cellular Respiration* 30 second jumping jacks
 3. (2m) *Cellular Respiration* 2 min jumping jacks
- 1 Straw
- Beaker with bromothymol blue solution

Procedure (directions):

1. Fill beakers to the 100mL mark with bromothymol blue solution.

Lab: Cellular Respiration

1. Blow bubbles (CO₂) into Rest cup until it changes to yellow. Time how long it takes to change to yellow and record this on your data sheet (rest cup).
2. Do jumping jacks for 30 seconds. Blow CO₂ into 30s cup. Time how long it takes to change to yellow and record this on your data sheet (30s cup). Breathe at the same rate as you did in step 1.
3. Do jumping jacks for 2 minutes. Blow CO₂ into 2 min cup. Time the amount of time it takes to change it and record this on your data sheet (2 min cup). Breathe at the same rate as you did in step 1.

Hypothesis (EDUCATED GUESS)

Table 1: Cellular Respiration HYPOTHESIS

Cup	Time it takes to change the color (compared to resting, shorter or longer)
Rest	
30 seconds Exercise	
2 minutes Exercise	

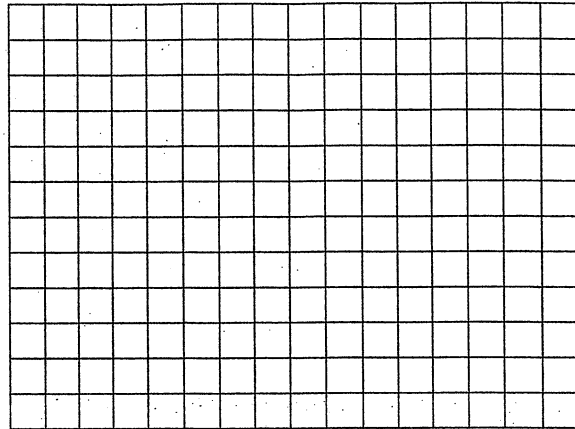
I predict that exercise will _____ (increase/decrease/have no effect) on the rate at which Carbon Dioxide is produced. I believe this hypothesis to be accurate because:

Cellular Respiration and Photosynthesis Data Sheet - RESULTS

Table 2: Cellular Respiration Lab Table

Cup	Time it takes to change the color (in seconds)
Rest	
30 seconds Exercise	
2 minutes Exercise	

Graph of Cellular Respiration Data



Analysis Questions – Cellular Respiration Lab

1. Look at the graph of your results. What happens when you exercise more? Did the amount of time it took to change the color of the cup increase or decrease?
2. Explain using your knowledge of cellular respiration and exercise *why* you got the results you got (Explain why the time *decreased* or *increased* as you exercised more).
3. What was the independent variable in this experiment?
4. What was the dependent variable in this experiment?
5. Fill in the diagram below using the following words: cellular respiration, photosynthesis, glucose, O₂, CO₂, ATP, and sunlight energy.

