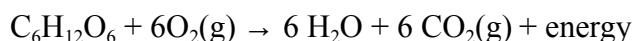


Name: _____ Period: _____

Cell Respiration-O₂ Part 1

Cell respiration refers to the process of converting the chemical energy of organic molecules into a form immediately usable by organisms. Glucose may be oxidized completely if sufficient oxygen is available by the following equation:



All organisms, including plants and animals, oxidize glucose for energy. Often, this energy is used to convert ADP and phosphate into ATP. It is known that peas undergo cell respiration during germination. Do peas undergo cell respiration before germination? The results of this experiment will verify that germinating peas do respire. Using your collected data, you will be able to answer the question concerning respiration and non-germinating peas.

Using the O₂ Gas Sensor, you will monitor the oxygen consumed by peas during cell respiration. Both germinating and non-germinating peas will be tested. Additionally, cell respiration of germinating peas at two different temperatures will be tested.

OBJECTIVES

In this experiment, you will

- Use an O₂ Gas Sensor to measure concentrations of oxygen.
- Study the effect of temperature on cell respiration.
- Determine whether germinated and non-germinated peas respire.
- Compare the rates of cell respiration in germinated and non-germinated peas.

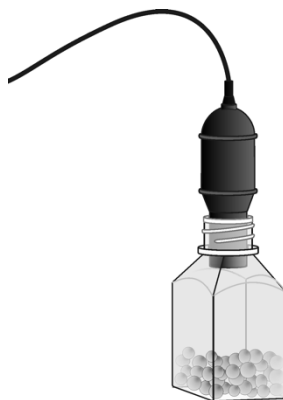


Figure 1

MATERIALS

computer
Vernier computer interface
Logger*Pro*
Vernier O₂ Gas Sensor
two 100 mL beakers

25 germinating peas
25 non-germinating peas
250 mL respiration chamber
ice cubes
thermometer

PROCEDURE

1. If not already done, connect the O₂ Gas Sensor to the Labquest interface.
2. Obtain 25 germinating peas and blot them dry between two pieces of paper towel. Use the thermometer to measure the room temperature. Record the temperature in Table 1. It may be plugged into the interface already.
3. Place the germinating peas into the respiration chamber.
4. Place the O₂ Gas Sensor into the bottle as shown in Figure 1. Gently push the sensor down into the bottle until it stops. The sensor is designed to seal the bottle without the need for unnecessary force.
5. Wait two minutes, then begin collecting data by clicking **Collect**. Data will be collected for 180 seconds. You need to push the play button for it to start collecting data!
6. When data collection has finished, remove the O₂ Gas Sensor from the respiration chamber. Place the peas in a 100 mL cup filled with cold water and ice cubes.
7. Rinse out the respiration chamber with water and then empty it. Using paper towel, thoroughly dry the inside of the respiration chamber with a paper towel.
8. Determine the rate of respiration:
 - a. On the Labquest interface with the data collected, click on ANALYZE. (On the top of the display)
 - b. Then tap on Curve Fit. Then Oxygen Sensor.
 - c. On the drop-down menu, choose linear fit.
9. Record the slope of the line, m , as the rate of respiration for germinating peas at room temperature in Table 2. Close the linear regression floating box. $m = \underline{\hspace{2cm}}$
10. Obtain 25 non-germinating peas and place them in the respiration chamber
11. Repeat Steps 4–9 for the non-germinating peas.
12. Pour the non-germinating peas back into the original cup labeled non-germinating peas.

Part II Germinating peas, cool temperatures

13. Remove the peas from the cold water and blot them dry between two paper towels.
14. Repeat Steps 4–9 to collect data with the germinating peas at a cold temperature.

DATA

Table 1	
Condition	Temperature (°C)

room	
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Table 2	
Peas	Rate of Respiration (%/min)
Germinating, room temperature	
Non-germinating, room temperature	
Germinating, cool temperature	

Questions

1. In complete sentences and in your own words (not your groups), do you have evidence that cell respiration occurred in peas? Explain.
2. In complete sentences and in your own words (not your groups), what is the effect of germination on the rate of cell respiration in peas?
3. In complete sentences and in your own words (not your groups), what is the effect of temperature on the rate of cell respiration in peas?
4. In complete sentences and in your own words (not your groups), why do germinating peas undergo cell

respiration?