

PRELIMINARY ACTIVITY FOR

Cell Respiration**Open Inquiry Version**

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.

In this Preliminary Activity, you will use a CO₂ Gas Sensor to determine the respiration rate of peas. After completing the Preliminary Activity, you will first use reference sources to find out more about peas, seeds, germination, and cell respiration before you choose and investigate a researchable question dealing with the cell respiration. Some topics to consider in your reference search are:

- peas
- seeds
- germination
- cell respiration
- carbohydrates
- glucose
- dormant

PROCEDURE

1. If your CO₂ Gas Sensor has a switch, set it to the Low (0–10,000 ppm) setting. Connect the CO₂ Gas Sensor to the data-collection interface.
2. Start the data-collection program. Allow 90 seconds for the sensor to warm up.

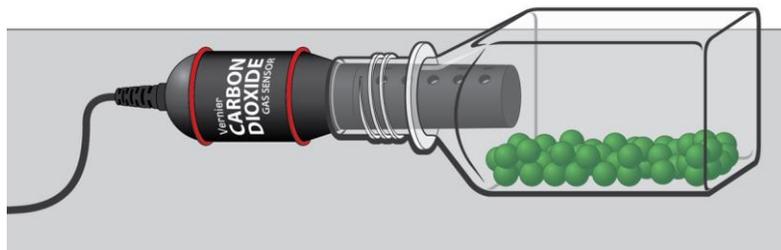


Figure 1

3. Prepare the peas for data collection.
 - a. Obtain 25 germinating peas and blot them dry with a paper towel.
 - b. Determine and record the mass of the peas.
 - c. Place the peas in the respiration chamber.
 - d. Place the shaft of the CO₂ Gas Sensor in the opening of the respiration chamber and lay flat, as shown in Figure 1.

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4. Pause 60 seconds, and then start data collection. Data will be collected for 600 seconds.
5. After data collection is complete, use the linear regression function to determine the respiration rate. Record the respiration rate in CO₂ ppm/s.

QUESTIONS

1. Use the respiration rate determined in Step 5, in CO₂ ppm/s, and the mass of your peas determined in Step 3, in grams, to determine the normalized respiration rate per gram of peas (CO₂ ppm/s/g).
2. Do the results of this investigation verify that germinating peas respire? How do you know?
3. What do you expect would happen to the rate of respiration if you repeated this investigation with non-germinating peas?
4. Why do germinating peas undergo cell respiration?
5. List three factors that could possibly affect cell respiration rate.
6. List at least one researchable question concerning cell respiration.