Cellular Respiration Lab Essay, Research Paper

Introduction

This lab was done to determine the relationship of gas production to respiration rate. Justin Pyka and I did the lab on December 12th, 2000 in Mr. Myers’ room. The lab was done with dormant pea seeds and germinating pea seeds. It was done to test the effect of temperature on the rate of cellular respiration in ungerminated versus germinating seeds. We had to determine the change in gas volume in respirometers. This was done to determine how much oxygen was consumed during the experiment. The respirometers contained either germinating, or non-germinating pea seeds. I think that the germinating seeds will have a higher oxygen consumption rate in a room temperature water bath than the non-germinating seeds. My reason for this hypothesis is that a dormant seed would not have to go through respiration because it is not a plant yet. A germinating seed would consume more oxygen because it is growing, and therefore would need to consume oxygen by going through the process of cellular respiration.

Methods and Materials

Materials:

Glass Vials

1 mL Glass Pipette Tubes

Rubber Stoppers

264 Germinating Pea Seeds

264 Dried Pea Seeds

100 mL Graduated Cylinder

Glass Beads

Absorbent Cotton

Solid KOH

Dry Cotton

25 Degree C Distilled Water Bath

10 Degree C Distilled Water Bath

Red Indicator (Safrin)

Syringe With Needle on End

Rubber Stoppers

Methods:

See lab handout for methods of completing the experiment and recording the results.

Note: Two tests were done for each step.

Results

See graphs for interpretation of results.

In the room temperature water bath, the glass beads, and the dry pea seeds and glass beads consumed the least amount of oxygen (see chart 1). The germinating pea seeds consumed the most oxygen. They consumed almost three times as much oxygen as the glass beads alone, and the glass beads and dry pea seeds.

According to my results, the vials containing the glass beads in the 10-degree C water bath consumed large amounts of oxygen (see chart 2). The vials containing the dry seeds and glass beads had the same result. I think that this is because the gas in the vials cooled, and when it cooled, it took up less space in the vial, therefore pulling the indicator down the respirometer tube, which would make it look like the contents in the vials consumed large amounts of oxygen.

The germinating seeds consumed almost no oxygen throughout the experiment in the 10-degree C water bath. I think that this is because when an organism cools down, all of its cellular functions slow down. Which means that the germinating seeds would slow down their respiration rates because of the colder temperature. The indicator stayed at about the same spot in the respirometer tube. That means that the germinating seeds were producing some gasses to offset the reduction in the space taken up by the gas in the vials caused by the cooler temperature.

Conclusion

After completing this experiment, I have come to the conclusion that a germinating seed of a plant consumes more oxygen than a dry seed of a plant. When the germinating seed is cooled down however, the rate of oxygen consumption is reduced drastically because all of the cellular processes are slowed down from the cooler surroundings.

I think that my hypothesis was correct because my results from the experiment show that the vials containing the germinating seeds consumed more oxygen in the room temperature water bath than the other vials.

This lab was a good representation of what effects temperature has on cellular processes because it showed that respiration slowed down when the temperature was reduced, and respiration increased when the temperature increased.