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**EFFECT OF TEMPERATURE ON ENZYME ACTIVITY**

**Date**: October 28, 2016

**Honor code**: On my honor, I have neither received nor given any unauthorized aid on this assignment.

**INTRODUCTION**

Enzymes are molecules of protein that are made from amino acid chains. It is a biological catalyst with three characteristics. The role of Enzymes is to increase the rate of a reaction.

Enzymes important because if the chemical reactions happen without enzyme, reactions in biological cells would occur too slowly. They are very important to such bodily functions as digestion, enzymes break down foods, allowing their nutrients to be absorbed into the bloodstream.

Some factors that affect enzyme activity are temperature, pH, enzyme concentration, substrate concentration, and the presence of any inhibitors or activators.

The reason for this lab experiment is for knowing how the temperature affect enzyme activity, when will the growth of the enzyme increase or decrease. When the temperature raised, the rate of an enzyme - catalyzed reactions will increase.

The liver produce bile, a green - colored digestive enzyme stored in the gallbladder during fasting. In particular, some enzymes breaking down certain amino acids and fatty acids which is make significant amounts of hydrogen peroxide. Its harmful to our body because of the huge amount of oxygen that contain in the hydrogen peroxide for the blood which is leading to potential issues. Enzyme in the liver break down harmful hydrogen peroxide into oxygen and water. When this reaction happens, oxygen gas escape and create bubble and foam.

|  |  |
| --- | --- |
| Word Equation | Hydrogen peroxide → Water + Oxygen |
| Formula Equation | 2H2O2 (aq) → 2H2O (l) + O2 (g) |

Hypothesis: When the temperature raised, the enzyme activity is increased and when the temperature is low, the enzyme activity decreased.

**MATERIALS**

Raw liver puree

Petri dish  
 Dropper Pipette

Hydrogen Peroxide solution

Forcep

Glass marking pencil

Ice bath

3 thermometers

25ml graduated cylinder

5 50ml beakers

Filter paper disks

Warm water bath

Time watch

Paper towel

Gloves

Goggles

**PROCEDURE**

Step 1: Wear gloves and goggles, use forceps to place a small piece of raw liver in open petri dish. Use a dropper pipette to put a drop of hydrogen peroxide solution on the liver.

Step 2: Select the proper equipment and technology to measure catalase activity ( filter paper disk)

Step 3: Use a graduated cylinder to place 25ml of hydrogen peroxide solution in 50 ml beaker.

Step 4: Use forceps to dip a filter paper disk in liver puree. Wipe out the excess liver on the filter paper disk by a tissue.

Step 5: Use the forceps to place the filter paper disk on the bottom of the beaker of hydrogen peroxide solution. Observe the phenomenon and record the time it takes to float the filter paper to the top of the liquid.

**DATA & RESULT**

1. Data table

|  |  |  |  |
| --- | --- | --- | --- |
|  | Temperature |  | Time |
| Room Temp Trial 1 | 26 |  | 15.44 |
| Room Temp Trial 2 | 27 |  | 12.38 |
| Room Temp Trial 3 | 27 |  | 13.2 |
| Cold Temp Trial 1 | 10 |  | 25.4 |
| Cold Temp Trial 2 | 10 |  | 26.23 |
| Cold Temp Trial 3 | 10.5 |  | 24.28 |
| Hot Temp Trial 1 | 34 |  | 3.29 |
| Hot Temp Trial 2 | 31 |  | 5.5 |
| Hot Temp Trial 3 | 30 |  | 6.43 |
| Cold temperature average | 26.67 |  | 16.67 |
| Room temperature average | 10.17 |  | 25.3 |
| Hot temperature average | 31.67 |  | 5.1 |

2. Graph of data

3. Observation

My observation is with hot water, it took a very short period of time to bubbling and the amount of bubble is pretty much. With the room temperature, the time it takes to bubbling is also short but longer than when it happens in hot temperature. With the cold water, it takes a longest time to bubbling and the amount of bubble is not as large as the other conditions.

**DISCUSSION**

1. The graph illustrates the affection of the temperature on the enzyme activity. Overall, the time for the enzyme activity decrease when the temperature rising up. Which mean it gets shorter time in the enzyme activity to happen when it in the high temperature and opposing, in the low temperature, it takes longer time to happen. The purpose that we have to graph the data is because to make it more easy for us to read and understand the trend of the data. When we read only the data in the table, it hard for us to summarize the information and see the relationship between each period of time and temperature.
2. It supports my hypothesis, because at first I guess that when the experiment happen in the high temperature, the enzyme activity increased, which mean it make more bubbles and shorter time to accomplish.
3. Some errors that affect our group’s result are that we not measure the right temperature and catch up exactly the time that the experiment occurs.
4. We have to repeat the experiment three times because we want to take the average of each conditions, for more authentic results we will have.
5. The average number show the typical value in a set of data which mean it make the result more exact.

**RESEARCH QUESTIONS**

1. Enzymes work by lowering the energy of a chemical reaction’s activation. Some chemical reaction took a long time to happen, therefore the role of enzymes are speeding up the rate of it and make it work smoother. A substrate binds to an enzyme to form an enzyme substrate complex and it allowing the substrate to go from a reactant to products in considerable less time when the enzyme was not available to drive the reaction.
2. Every enzyme has its optimum performance at a very specific acidity level and if the enzyme is placed into a very acidic or basic environment ( ex: placing salivary enzymes into a acidic solution) then the enzyme will not function properly and it ill denature. This means that its shape will change and it will be permanently unable to continue what is is supposed to be doing.

**REFLECTION**

1. After doing the experiment, I have learn many new skills such as how to measure the measurment, how to record the data, how to do the table and graph. Also we know how to do things in teamwork to save the time.
2. In my individual opinion, I think I like all of the work such as measure things or record the times or see the experiments occur, however I was struggling with the smell of the liver, I was almost vomit when I accidently smell the liver. The experiment is easy however I think it should take a longer time to finish the work than only in 50 minutes.
3. I think our group was work collaboratively and organized. We gave our members do each works such as one measure the temperature of the liver, one record and write down the data, one take the hydrogen peroxide and one cleaning the experiment after each trials.
4. For improve our teamwork and organizational skills, I think we should give what jobs to each members wisely and equally at first. Then we should try to understand each other to can do things more easily.