NAME_____ PERIOD_____ DATE_____

CATALASE LAB

Introduction

In this investigation, you will study several factors that affect the activity of enzymes. The enzyme to be used is catalase (also called peroxidase), present in most cells and found in high concentrations in liver and blood cells. You will use liver homogenate as the source of catalase. Catalase promotes the decomposition of hydrogen peroxide, H_2O_2 in the following reaction.

$$2H_2O_2 \lozenge 2H_2O + O_2$$

Hydrogen peroxide is formed as a by-product of chemical reactions in cells. It is toxic and would soon kill cells if not immediately removed or broken down.

Materials

10 mL graduated cylinder
100 mL graduated cylinder
reaction chamber (dropper bottle with cut off dropper)
pan of water (enough to cover 100 mL graduated cylinder when lying on side)
hydrogen peroxide
catalase solution
timer

Procedure

NOTE: In all experiments, make certain that your reaction chamber is extremely clean. Catalase is a potent enzyme, and if the chamber is not washed thoroughly, enough will adhere to the sides to make subsequent tests inaccurate.

1. Obtain all materials. Be sure pan is filled with water.

2. Stand the reaction chamber upright and carefully add 10 mL of hydrogen peroxide solution.

3. Tightly stopper the chamber to avoid evaporation.

4. Lay the 100 mL graduated cylinder on its side in the pan so that it fills with water completely. If any air bubbles are present, carefully work these out by tilting the cylinder slightly while keeping it underwater at all times.

The next steps need to be performed quickly but safely in order to produce accurate results. The goal is to capture the air bubbles produced from the reaction chamber into the graduated cylinder as early as possible after the reaction begins.

5. Add three drops of catalase to the hydrogen peroxide in the reaction chamber, stopper the chamber and immediately submerge the chamber in your pan of water. Be sure to orient the tip of the chamber is beneath the graduated cylinder allowing the air bubbles to move directly from the reaction chamber to the graduated cylinder.

6. Every 30 seconds, measure and record the amount of air in the graduated cylinder. Take measurements for 10 minutes for each trial.

7. Thoroughly clean your reaction chamber and repeat the same procedure using 1 drop of enzyme for trial 2, 2 drops of enzyme for trial 3 and 4 drops of enzyme for trial 4.

Data Table - rough draft

mL of Gas Collected

drops of catalase	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
1																				
2																				
3																				
4																				

Name_____ Period_____ Score_____/30

CATALASE LAB REPORT

Prelab—five points total

Carefully read through the introduction and procedure to the Catalase lab and answer the following prelab questions.

1. What enzyme are we using in this experiment? (1 point)

2. Where is the enzyme normally found? (1 point)

3. What reaction does this enzyme catalyze? (1 point)

4. How is hydrogen peroxide produced in the cells and why is it important to get rid of it? (1 point)

5. Why is it important to be as efficient as possible when carrying out this lab? (1 point)

Data—ten points total

Students will compile a data table and construct a bar graph using excel. Print your graph and data table and attach to this page to turn in for your completed report

Analysis—15 points total

1. Is the action of catalase constant with time? (1 point) Fully explain and support your answer. Refer to data and/or graph or class discussion when necessary. (2 points)

2. If you ran a new trial using 10 drops of enzyme, do you think more, less, or the same amount of O_2 would be produced compared to the previous runs? (1 point) Fully explain and support your answer. Refer to data and/or graph or class discussion when necessary. (2 points)

3. If you had allowed the trial using 1 drop to continue past 10 minutes until the reaction had run to completion, approximately how much O_2 do you think would be produced? (1 point) Fully explain and support your answer. Refer to data and/or graph or class discussion when necessary. (2 points)

4. What do you think would happen to the amount of O_2 produced if you ran the experiment in a pan of hot water? (1 point) Fully explain and support your answer. Refer to data and/or graph or class discussion when necessary. (2 points)

5. What do you think would happen to the amount of O_2 produced if you added 20 mL of hydrogen peroxide to your reaction chamber instead of 10 mL? (1 point) Fully explain and support your answer. Refer to data and/or graph or class discussion when necessary. (2 points)