

To investigate the  
effect of hydrogen  
peroxide  
concentration



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To Investigate the effect of hydrogen peroxide concentration on enzyme catalase  
Introduction: Enzymes are proteins. They function as biological catalysts. They lower the energy barrier of a reaction so that the reaction can take place at body temperature.

Also, they can speed up Metabolic reactions without being changed or used up. During a reaction, an enzyme molecule combines temporarily with the substrate. When the reaction is complete, the enzyme molecules returns to its original form and the product is released.

So enzymes are never wasted and always recycled.

Enzymes are proteins. Most of them are denatured at high temperatures and extreme values of pH. Moreover, enzymes are specific in action. Each enzyme catalyses only one type of reaction. From basic knowledge, the rate of reaction will be affected by the concentration of the reactant.

The higher concentration of reactant, the faster the rate of the reaction. In this experiment, hydrogen peroxide acts as substrate and the catalase in potato tissue is the enzyme. The equation of the reaction is:

Catalase Hydrogen peroxide  $\rightarrow$  oxygen + water  
In the set-up, pipette is used because it is easy to observe the movement of the water due to the small diameter of pipette. By measuring the distance of the water move in the pipette and the time of the experiment, we can find out the reaction rate.

By repeating the above measurement, we can find out the reaction rate under different concentration of hydrogen peroxide. As to compare the effect  
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of hydrogen peroxide concentration on catalase. In this experiment, the Independent variable is the concentration of hydrogen peroxide.

The dependent variable is the volume of oxygen which is released by hydrogen peroxide showing the rate of the reaction. The volume of oxygen can be measured by taking the initial and final reading of water in the pipette.

The controlled variables are the size of potato strips, time for taking the rate of reaction and the volume of hydrogen peroxide added. First, the size of potato strips can be kept constant using a ruler to measure the length of them. Then, the volume of hydrogen peroxide added can be kept constant using a syringe to measure.

The assumption of the experiment is that all oxygen released from the reaction was collected by pipette and the surface area of each potato strip is the same. Also, the precaution of this experiment is that the potato strips should be totally immersed in the hydrogen peroxide solution. The prediction is that the concentration of hydrogen peroxide increases, the rate of the reaction increases, thus more oxygen will be produced.

1. Rinse the pipette by (a) Sucking a small amount of distilled water into the pipette with the help of pipette filler. (b) Allowing the liquid to contact the whole inner surface of the pipette. (c) Discarding the liquid in pipette into a beaker. 2.

Obtain potato strips (a) Put a potato on a clean white tile. (b) Cut the potato strips to 1 cm x 1 cm x 3 cm with a ruler and a razor blade. (c) Put the potato

strips in the beaker with distilled water. 3. Use a forceps to put a potato strip in the syringe.

4. Suck a small amount of distilled water (" 1 ml) into the pipette with the help of pipette filler and mark the initial position of the water. 5.

Use a clamp to hold the pipette on retort stand.

6. When the experiment start (a) Suck 5 ml hydrogen peroxide by the syringe. (b) Connect the mouth of the syringe and the mouth of pipette with rubber tubing immediately and start the stop-watch. 7. Leave the set-up for 15 minutes. 8.

After 15 minutes, mark the final position of the water. 9. Repeat step 3-7 again Nith different concentration of hydrogen peroxide. 10. Calculate the distance of the Nater movement at each concentration of hydrogen peroxide.

Tabulate the results and plot a graph.