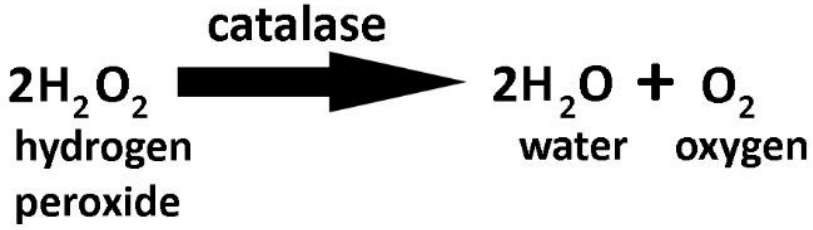
Effect of Concentration on Enzyme Activity: Catalase

As you recall from reading the section on naming and preparation of enzymes, catalase is an enzyme found in nearly every organism. It breaks down hydrogen peroxide to produce water and oxygen. If you haven't read the section on naming and preparing enzymes, please read it now before proceeding with the lab.



When studying enzymes researchers can measure the disappearance of the substrate or the appearance of the product. The design of the study and the characteristics of the enzyme determine which approach is taken. In the case of catalase, you will be looking for the production of bubbles, indicating the formation of the product, oxygen.

Enzymes have evolved to function optimally under specific conditions of pH, temperature and concentration. The activities in today's lab are designed to exemplify these characteristics. You will be measuring the activity of catalase from either potato or liver extract at various enzyme concentrations. Write a hypothesis for your experiment and the response of catalase at various enzyme concentrations:

_____

_____

Materials

Test tubes – 4	Sharpie	Graduated cylinder
Pipettes	Test tube rack	Distilled water
Catalase extract	2 Small beaker - 15 mL	Stopwatch
Hydrogen peroxide	Ruler	Stoppers (optional)

Procedure

1. Pick up 4 test tubes and a test tube rack from the supply table.

2. Mark each test tube at 1 cm, 2 cm, 3 cm and 5 cm. Label the tubes A, B, C and D.

3. Pour ~10 mL of catalase extract into one small beaker. Pour ~ 10 mL of hydrogen peroxide into the other small beaker.

4. Fill tube A to the 3 cm line with water. Add hydrogen peroxide to the 5 cm line, mix the tube. Mixing can be done by stoppering the tube and inverting and then removing the stopper or by simply placing your thumb or Parafilm over the tube and inverting. Make sure the tube is open to allow the bubbles to form freely. Start the timer and time for 45 seconds. Record the height of the bubbles in mms ____.

5. Fill tube B to the 1 cm line with catalase extract. Add water to fill the tube to the 3 cm line. Gently swirl the tube to mix the water and extract. Add hydrogen peroxide to the 5 cm line, mix the tube. Mixing can be done by stoppering the tube and inverting and then removing the stopper or by simply placing your thumb or Parafilm over the tube and inverting. Make sure the tube is open to allow the bubbles to form freely. Start the timer and time for 45 seconds. Record the height of the bubbles in mms ____.

6. Fill tube C to the 2 cm line with the catalase extract. Add water to fill the tube to the 3 cm line. Gently swirl the tube to mix the water and extract. Add hydrogen peroxide to the 5 cm line, mix the tube. Mixing can be done by stoppering the tube and inverting and then removing the stopper or by simply placing your thumb or Parafilm over the tube and inverting. Make sure the tube is open to allow the bubbles to form freely. Start the timer and time for 45 seconds. Record the height of the bubbles in mms ____.

7. Fill tube D to the 3 cm line with the catalase extract. Add hydrogen peroxide to the 5 cm line, mix the tube. Mixing can be done by stoppering the tube and inverting and then removing the stopper or by simply placing your thumb or Parafilm over the tube and inverting. Make sure the tube is open to allow the bubbles to form freely. Start the timer and time for 45 seconds. Record the height of the bubbles in mms ____.

	mL (cm of catalase)	**mms of bubbles**	**Was catalase active?**
A			
B			
C			
D			

Was your hypothesis supported?

What was your dependent variable?

What was/were your independent variables?

Name the enzyme.

What are the products of the enzyme?

Graph your results.

What can you conclude about the effect of concentration on enzyme activity?