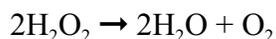


How to Have Fun with Fresh Liver

In this experiment we will demonstrate some factors that affect the rate of enzyme activity. Remember that changing the pH, adding more enzyme, adding more substrate, and heating can all affect how quickly enzymes function.

Hydrogen peroxide is a toxin that forms readily from water and oxygen. The cells of organisms that live in an oxygen rich environment require the enzyme catalase which decomposes hydrogen peroxide into oxygen and water as follows:



In this procedure we will use both liver and potato as a source of catalase.

Procedure

1. Label three small test tubes #1, #2, and #3.
2. Add 2 mL of hydrogen peroxide to each tube. Add a few grains of sand to tube #1, a small (1 cm³) piece of potato to tube #2, and a similarly sized piece of liver to tube #3.
3. Observe the reaction rate for each tube using 0 to indicate no reaction, 1 to indicate slow, 2 to indicate moderate, 3 for fast, and 4 for very fast. Do this for all reactions. Also, note any reaction products.
4. When the reaction has stopped, divide the hydrogen peroxide in tube #3 into two new tubes labeled #4 and #5.
5. Remove the liver from tube #3 and place half in tube #4 and half in tube #5.
6. Add a second piece of liver to tube #4.
7. Add 1 mL of hydrogen peroxide to tube #5.
8. Add a few grains of sand and another fresh piece of liver to the mortar and grind it using the pestle.
9. Remove the liver and place it in a clean tube labeled #6. Add 2 mL hydrogen peroxide.
10. Obtain a fresh piece of liver and place it in a clean test tube labeled #7. Add enough water to barely cover the liver. Boil it by placing the whole test tube in the hot water bath for 2 minutes. Do not start timing until the water inside the test tube has started to boil.
11. Pour off the water and add 2 mL hydrogen peroxide.
12. Place a small piece of fresh liver in another test tube labeled #8.
13. Add 3 drops of dilute HCl and 2 mL of hydrogen peroxide.
14. Label another test tube #9. Add 2 mL hydrogen peroxide and a tiny pinch of manganese dioxide.

In your discussion, be sure to:

1. Compare the activity ratings for all tubes.
2. Give a reason for testing sand.
3. Account for difference between whole and ground liver.
4. Explain the effect of boiling.
5. Explain the difference between liver and potato.
6. Explain the difference between tube 4 and 5.