BIO II Honors Laboratory Exercise: Enzyme Catalysis of Hydrogen Peroxide

Lab Preparation

1. Obtain six small glass or plastic beakers, one 10mL graduated cylinder, one 1mL pipet, one 6-mL syringe, one 12-mL syringe, paper and pencil to label beakers.
2. Put approximately 70 mL of 1.0 M H2SO4 in one of your beakers (preferably a glass beaker).
3. Put approximately 70 mL of 1.5% H2O2 in one of your beakers. **Be sure to label your beakers so not to confuse the H2SO4 and H2O2.**
4. Put approximately 10 mL of catalase solution in one of your beakers.
5. Put approximately 40 mL of 4% KMnO4 solution in another one of your beakers.

Lab Procedure

1. Measure out exactly 10 mL of 1.5% H2O2 and put it in an empty beaker (*reaction chamber*).
2. Draw up exactly 1 mL of catalase solution into your 1mL pipet.
3. Draw up exactly 10 mL of 1.0 M H2SO4 into the 12mL syringe.
4. Ready the stopwatch on your cell phone so that you can accurately time your enzymatic reaction.
5. Have one person squeeze the 1 mL of catalase into the *reaction chamber* containing the 10 mL of 1.5% H2O2 while another person starts the stopwatch and another person swirls the reaction chamber gently to mix the reactants.
6. Let the enzymes react for **10 seconds** and then immediately squirt all 10 mL of the 1.0 M H2SO4 into the *reaction chamber* to denature the enzymes and stop the reaction.
7. Using the 6mL syringe, draw up 6 mL of 4% KMnO4. Slowly add the 4% KMnO4 dropwise to the reaction chamber while a partner gently swirls the chamber to mix the chemicals. The KMnO4 should react with any remaining H2O2 and the liquid should return to a clear color. Continue this process until the reaction slows and the liquid in the chamber remains pink. This means that there is now no more H2O2 left to react with the KMnO4. Record in your journal the volume of KMnO4 required to break down all the remaining H2O2 (the amount of KMnO4 that you used). This process is known as a titration.
8. Pour the contents of your reaction chamber down the sink. **Rinse the chamber** with water well and **dry it out** with a paper towel.
9. Repeat this procedure allowing the catalase to react with the H2O2 for the following times before adding the 1.0 M H2SO4: **30 seconds, 60 seconds, 120 seconds, 180 seconds, 360 seconds**.
10. Be sure to record the amount of KMnO4 used in titration for each time interval.
11. Clean your lab station when you are finished. Dispose of all chemicals down the sink. Be sure to thoroughly rinse out all beakers and equipment.