

Seven: Alternative models are recognized and analyzed...

Students will study toothpickase	Breaking toothpicks represents a degradative enzyme, like catalase. This is perhaps the best kinesthetic activity to model enzyme activity. The data you will collect is also biochemically reasonable.	Reference: Access Excellence, AP Biology Exercise
Instructions	<p>Review or introduce enzyme action. Tell students that for this class, THEY are acting as an enzyme. They will still be students at the end of class!</p> <p>Distribute a small number of toothpicks all over the room (toss them gently). Students will get them broken in no time (Enzyme excess) Distribute large numbers of toothpicks to each team and time how many are completely broken in a short interval, say 5 seconds. Repeat this for 10, then 15 seconds, etc. Collect data. Ask students to put 1 hand behind their back. Their breakage rate will be lower, depending on whether they keep the strong or weak hand in back</p> <p>Collect data at each stage. For time intervals, plot a TIME COURSE (# broken on Y vs X seconds (time point). By using Lineweaver Burk, you can find the rate and maximum rate of reaction.</p>	<p>Materials Toothpicks (choose round OR flat) Students</p> <p>(Mutation) (Severity of mutation)</p>

Eight: Students research popular and scientific literature

Following the conclusion of the class experiment, student teams can select one of the following pathways to explore:

- What is the effect of varying temperature on yeast catalase activity?
- What is the effect of varying pH on yeast catalase activity?
- Compare the activity of catalase from two different sources. Catalase activity in plant tissue (lettuce, potato, carrots etc.) homogenates can easily be studied in the lab.
- Continue working with yeast catalase and vary the procedure and equipment used to get more quantitative data.

This is a good time for students to do some library/internet research to find background information relating to one of these pathways.

Many levels of searches are possible:

Students can begin simply, by looking up general information about enzymes in library databases like SIRS and Proquest. They can look at public web sites like "Genes and disease" <http://www.ncbi.nlm.nih.gov/disease/>.

Encourage students to start with general information and then gradually help them to find information that is more specific to the experiment that they are planning. Use Internet search engines to look for:

1. Information relating temperature or pH to enzyme activity
2. Information about catalase
3. Information about catalase from fruits and vegetables

As they gain experience locating and understanding information ... search in GenBank and PubMed, navigating to the National Center for Biotechnology Information web site at <http://www.ncbi.nlm.nih.gov/>.