**Modeling in AP Biology**

**Title: Enzyme Reaction Rates**

**Theme(s) I - Science as a Process**

**V - Relationship of Structure and Function**

**VI - Regulation**

**Topic(s) IA - Enzymes**

**Authors: Kimbell Reitz, John Gensic**

**Engagement:**

In the last lesson the students designed and performed an experiment to test how hydrogen peroxide reacts with different types of cells. (See Experimental Design lesson). At the end of that lesson the students shared their results as well as additional questions and observations they may have had. During the questioning, The teacher skillfully directed the discussion toward the fact that not all systems produced the same amount of bubbling and that certain variables may influence this. The discussion led to the selection of a list of variables, enough for each lab group to test a different one.

**Leading Question:**

What are the variables that influence the rate of enzyme catalyzed reactions?

**Summary of Investigation:**

The students will pose a question, prediction and hypothesis relating to the variable they are to test. They will then design and perform an experiment and, share the results with the class.

**Equipment Used:**

General lab equipment

model organisms from last lesson student requested equipment (optional) hot plates

dilute HCl pH papers NaCl

distilled water

**Description of Procedure, notes (teacher manual)**

When each group has a question and prediction they should put it on their whiteboard and share it with the class. Then, the teacher should show an example of hypothesis writing on the board. (It is not necessary to have a null hypothesis at this time and AP does not require it but AP does require the hypothesis to be in the “if... then...” format). The students will then formulate a hypothesis to be tested.

When this has been accomplished the students will design a procedure to test the hypothesis. It is not necessary to whiteboard this but the teacher should check and discuss all procedures with each group before they go into the lab. Each procedure should be safe. The teacher should ask questions about the parts of the procedure learned about in the last experiment to help the students a little. The teacher should not feel like they need to correct the procedures for the students too much. The students

will likely need to refine their procedure but should be allowed to discover some mistakes on their own. The teacher should ask questions and give feedback during the experiment when appropriate and necessary.

When the students have gathered results they should prepare to share with the class by means of whiteboards. The students should be taking notes and asking each other questions about procedures and results.

**Follow up Questions: On the whiteboards.** Sketch your results.

How did variable x (temperature, salinity, pH, etc) impact the rate of reaction? Which treatment impacted the reaction rate the most? least?

Explain why you think this is so? Is this what you predicted?

**Questions during board meeting:**

Why do these variables effect enzyme reactions?

Were the experiments designed properly? Explore this. How could your experimental design be improved? Explain what you think just happened.

**For journals:**

What do these results mean for cells/organisms?