

What Affects the Function of an Enzyme?

Engagement Activity

Silent Demonstration

Directions for the demonstration

Students are instructed to take notes, move to where they can see, and remain silent during the demonstration. The teacher holds up a pair of scissors and a piece of paper so that everyone can see them. The paper is then cut in half. The teacher holds up the two pieces of paper (from the first part of the demonstration) and a stapler. The pieces of paper are then stapled together. The teacher announces that the demonstration is over.

Questions posed to students

The demonstration that you have just seen is an analogy for enzyme action. Name the enzymes, substrates, and products of the demonstration. [The scissors and stapler are enzymes; the whole paper and pieces of paper are substrates for one reaction and products of another reaction] *Note: Inspiration, an overhead, or a chalk board can be used to record the responses. This gives time for students to visualize the answers.*

What types of reactions were observed? [Synthesis and decomposition/hydrolysis; this question may be inappropriate if students are not familiar with the content.]

Other than enzymes and substrates, what was needed for the reactions to occur? [Energy was needed; the teacher supplied this in the demonstration.]

What would alter or prevent the reactions from occurring? [Lack of energy, change in the shape of the enzyme – dull or damaged scissors, no staples in the stapler.] The teacher guides the students to these answers during the summary if they are not established here. Shape-fitting toys can be used to emphasize the importance of shape.

Summary

Energy is necessary for reactions to occur. The amount of energy needed is called the *activation energy*. Enzymes work by lowering the activation energy needed for a reaction. The shape of an enzyme is critical to accomplishing this. If sufficient energy is not available, the reaction does not occur. This is why we refrigerate or freeze foods. Enzymes are made of protein and proteins can be denatured. That is, temperature, pH, salinity, or other environmental factors may change the shape of the molecule.

Teacher note

This leads into *The Effects of pH on the Function of Catalase* laboratory investigation (Exploration Activity).