TEACHER NOTES

Initial Explorations of a Floating Disc Assay for Yeast Catalase Activity

Purpose: To allow the students time to freely explore a floating disc assay system, making quantitative and qualitative observations. The observations will be used to design a class experiment to determine the effects of varying the concentration of the substrate, hydrogen peroxide, on the rate of its decomposition when catalyzed by the enzyme yeast catalase.

Description of the assay: The assay system consists of a filter paper disc saturated with a yeast suspension containing the enzyme catalase. The disc is then dropped into the substrate (hydrogen peroxide). As the hydrogen peroxide decomposes into water and oxygen gas, bubbles of oxygen collect on the filter paper disc and it rises to the surface of the hydrogen peroxide solution. The time it takes for the disc to rise is an indication of the rate of the decomposition reaction and the activity of the enzyme.

Materials for each pair of students:

24-well micro plate (1)
Small plastic cups (3)
3% hydrogen peroxide (10 mL)
Distilled water (10 mL)*
Yeast suspension (10 mL)**
Forceps (1)
Plastic transfer pipette (3)

*Students can make their own dilutions of peroxide, using drops of water and peroxide in the microplate wells. Let students explore.

**Prepare the yeast suspension by adding a package of dry yeast to 150 mL of warm water to which a teaspoon of sugar has been added. "Proof" the yeast by letting this mixture stand, with occasional stirring, for 30 minutes before use.

***Students can get good data by counting seconds.

Exploratory activity (students work in pairs): Give students the materials and a very brief introduction. Include a review of the definition of catalyst and enzyme, and the following information. Let them explore the system on their own. Emphasize the importance of writing thorough observations in their data log.

Script:

The enzyme used in this investigation, catalase, is produced by living cells, including yeast cells. The enzyme catalyzes the decomposition of hydrogen peroxide, a toxic by-product of cell metabolism, into water and oxygen. You have been provided with a suspension of living yeast cells. Soak a filter paper disc in the yeast suspension, then drop it into a well containing hydrogen peroxide. Observe. You have also been given some water to use in making dilutions of hydrogen peroxide. Take about twenty minutes to explore this system, using different concentrations of hydrogen peroxide in the wells. Record as many observations as you can.