

enzyme chemistry

Protease

Many fruits contain naturally occurring enzymes that have the ability to break down protein. This can be demonstrated using the protein in gelatin as the substrate. (Note: These demonstrations could be setup beforehand.)

demo 3. enzymes breaking down protein

Preparation Time 90 minutes

Laboratory Time 2-3 hours

Prepare the gelatin dessert according to the package directions and fill 100 ml graduated cylinders to the 90 ml level.

Place in a refrigerator. After the gel is formed, add 10 ml of fresh pineapple, kiwi, or papaya juice and label the cylinder.

Place a marble on the gelatin and observe over several hours.

Students should observe that the marble will sink as the enzyme in the juice breaks down the gelatin.

Variations

1. Incubate the cylinders at different temperatures to determine the effect of temperature on enzyme action.
2. Heat the fruit juice to 100°C for 2 minutes before adding to the gelatin to demonstrate the concept of enzyme denaturation.
3. Mix the fruit juice with an equal volume of vinegar before adding it to the gelatin dessert to demonstrate the effect of pH on enzyme action. Like heat, acid can cause denaturation of enzymes with a resultant loss of activity.

Direct the student to read the preparation instructions for a package of gelatin dessert. Ask the students to comment on the precaution statement:

TO ADD FRUIT OR VEGETABLES:

Refrigerate gelatin 1 1/2 hours or until thickened. Stir in 1 1/2 to 3 cups chopped fruit or vegetables (well-drained, if using canned). Refrigerate 4 hours or until firm.

NOTE: DO NOT use fresh or frozen pineapple, kiwi, gingerroot, papaya, figs, or guava. Gelatin will not set.

