

Advance Preparation

Session One

Fill each of the eight alcohol burners halfway with ethanol. Use a pencil or pen to make a coil with 5–6 turnings on one end of each of the lengths of copper wire.

Sessions One and Two

You will need fresh 3% hydrogen peroxide solution for each session. For the demonstration in Session One, have two 100-mL graduated cylinders, each filled with 70–80 mL hydrogen peroxide. For the student activity in Session Two, each group of four students will need a 200-mL sample. Sixteen-oz. (473 mL) bottles of hydrogen peroxide are readily available at drug stores and supermarkets. You can provide each student group with a full bottle, or split each bottle into two containers and provide one for each student group.

Sessions Two and Three

For Activity 26.2, Parts A and B (Session Two) and Part C (Session Three), you will need a white potato for each class. (It is important to use white potatoes, rather than some other variety.) Each team of two students needs to mash a piece of potato approximately 2 cm x 2 cm x 2 cm to produce an adequate quantity of fresh potato liquid with a sufficient concentration of the enzyme catalase. As an alternative natural catalyst to potato liquid, you can use liver homogenate.

It is possible to make a large batch of potato liquid for the students by blending an entire potato with a small amount of water, then straining it through cheesecloth. However, a fresh batch must be made at the beginning of each class. Potato liquid that has been standing for any length of time will not contain a high enough concentration of catalase to adequately catalyze the decomposition of the hydrogen peroxide.

Because acidified potassium permanganate solution has a short shelf-life, the 0.01M potassium permanganate solution provided has not been acidified. Before using the 0.01M potassium permanganate solution you will need to add 10 drops of the 1M sulfuric acid solution provided in the kit to each 30-mL bottle of 0.01M potassium permanganate solution.

Continued on next page →

Advance Preparation (cont.)

Session Six

You will need to prepare a sufficient amount of lactase solution and lactose solution for each of your classes. The following instructions will provide you with enough for one class; increase the amounts as appropriate for the number of classes you teach.

Prepare the lactose solution by adding 50 mL of water to 0.5 g of lactose powder and stirring thoroughly. Fill eight 30-mL graduated cups (one for each group of four students) with 5 mL of lactose solution.

Prepare the lactase solution by thoroughly crushing one tablet of lactase digestive enzyme into a powder. Any clean, heavy object, such as the iron cylinders students use to crush potatoes, can be used to crush the tablet. Carefully pour the crushed tablet into a 150-mL beaker and add 100 mL of water. Stir thoroughly. Filter the suspension into a clean beaker to remove any undissolved material. Put approximately 1 mL (one dropperful) of the filtered lactase suspension in each of 16 test tubes (two for each group of four students).

Teacher's Note: When replenishing your supply of lactase tablets, make sure to purchase tablets that do not contain glucose or dextrose.

Materials

Session One (26.1)

T For the teacher

Transparency 26.1, "Catalysis of Ethanol into Acetaldehyde"

- 1 container of oxy pellets (manganese dioxide)**
- * 1 immersion thermometer**
- * 2 100-mL graduated cylinders**
- * 1 bottle of 3% hydrogen peroxide solution**
- * overhead projector**

■ For each group of four students

- 1 30-cm copper wire with coiled end**
- 1 15 mm x 125 mm test tube**
- 1 60-mL bottle of ethyl alcohol (denatured ethanol)**
- 1 alcohol burner (or Bunsen burner)**
- * 1 250-mL beaker**
- * matches or lighter**

■ For each student

- * 1 pair of safety glasses**

**Not supplied in kit*