

## Food Composition Chemistry

### *Taken from IFT Mini-Experiments in Food Science Series*

The banana consists of approximately 75% water, 25% carbohydrate, and only a trace of protein and fat. It also has relatively high levels of calcium and phosphorus and is especially rich in potassium. The carbohydrate in the typically green, unripe banana is mostly in the form of starch, which consists of long chains of covalently bonded glucose molecules. However, as the banana ages and ripens, the starch is converted to glucose, which gives the ripe fruit a very sweet taste. In this demonstration, students will observe the procedure used to test the unripe and ripe banana for starch and sugar content.

#### **Demo I. Test for starch**

Preparation Time	15 minutes
Laboratory Time	5 minutes

Starch will form a dark blue color when exposed to iodine solution. This can be demonstrated easily by putting a few drops of iodine solution on a starch-containing food. Prepare a 10% cornstarch solution (1 g in 10 ml of deionized water), then place a few drops of iodine on a piece of bread and into the corn starch solution. The cornstarch solution and the bread should both give a positive result (blue-black) for starch.

Cut a thin slice of green banana and a slice of dark ripe banana.  
Add a drop of iodine solution to the surface of each slice.

Students should observe that the green unripe banana gives a positive result (blue-black) for starch.

#### **Demo 2. Test for sugars**

Preparation Time	15 minutes
Laboratory Time	10 minutes

Fehling's solution can be used to detect the presence of simple sugars. This reagent can be purchased from a science equipment supplier. The presence of sugar is demonstrated by preparing 2 ml solutions of 0.5% glucose, 1.0% glucose, and 2.0% glucose. When treated with 5 ml of Fehling's solution, the 0.5% glucose will turn green, the 1.0% solution yellow, and the 2.0% solution orange-red.

Place a slice of the green, unripe banana in a test tube and a similar slice of the dark ripe banana in another test tube. Mash each banana slice with a separate stirring rod.  
Add 10 ml of Fehling's solution to each tube.

The ripe banana should give a positive test (red precipitate) indicating that the starch has been converted to glucose.