

Purpose

To test food for complex carbohydrates

Background

Carbohydrates are large groups of compounds that include sugars and starches. These compounds are made naturally by plants. Carbohydrates are the major source of energy for the body. Most foods contain carbohydrates. There are two major types of carbohydrates—simple and complex. Both simple and complex carbohydrates are necessary for a healthy body.

Simple carbohydrates are also called simple sugars. Simple sugars are found in fruits, milk, and foods with refined sugars, such as sugary snacks. Simple sugars from fruits and milk are healthier because these foods contain vitamins, fiber, and other nutrients. Refined sugars should be limited because they contribute calories with very few nutrients.

Complex carbohydrates are also called starches. Starches include grain products such as bread, crackers, pasta, and rice. Some complex carbohydrates are healthier than others. Refined grains are grains that have been processed, removing nutrients and fiber from the grains. White flour and white rice are examples of refined grains. Most refined grains are “enriched,” which means certain vitamins and iron, but not the fiber, are put back in after processing. Unrefined grains, or whole grains, contain vitamins, minerals, protein, and fiber. Fiber is very important for the digestive system and heart health.

The United States Department of Agriculture (USDA) offers tips to help put more whole grains in your diet. Visit the USDA web site at www.mypyramid.gov for information about eating a well-balanced healthy diet.

You can use an iodine solution to detect the presence of complex carbohydrates. The yellow-orange iodine will turn blue-black as it reacts with starch. (The iodine solution will show no reaction with simple carbohydrates or sugars.)

***Note:** Iodine may stain when it comes into contact with the skin. There may be some reactions associated with iodine. Please refer to a Material Safety Data Sheet (MSDS), which you can find online at sites such as <http://www.delasco.com/pcat/pdf/starchio.pdf>.

Teacher Prep

Cut the potatoes and apples into thin slices. Prepare an iodine solution for each group as follows:

1. Fill the measuring cup $\frac{1}{2}$ full of water.
2. Add 20 drops of iodine to the water in the cup and stir. Note: Straws or pipettes may be substituted for eyedroppers. See diagram 1.

Procedure

1. Put on gloves and safety goggles.
2. Place a small amount of cornstarch on a paper plate.
3. Using the eyedropper, apply a few drops of the iodine solution onto the cornstarch.
4. Observe the color of the iodine on the cornstarch. Because cornstarch is a complex carbohydrate, this sample will be a control for comparison of other samples.
5. Choose a food sample to test and place it on a paper plate.

Materials (per group)

bread slice
crackers
potato slice
rice
cornstarch
white granulated sugar
apple slice
paper plates
eyedropper
science journal
pen or pencil
gloves
safety goggles
500-mL measuring cup
with iodine solution

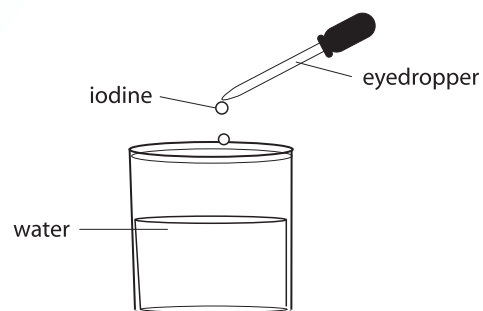


Diagram 1

Black and Blue

- Using the eyedropper, apply a few drops of the iodine onto the food sample.
- Observe and note the color of the area where the iodine solution was applied. Foods that contain starch will turn blue-black when the iodine is added to them. See diagram 2.
- Record your observations in your science journal.
- Continue testing until all samples have been tested.

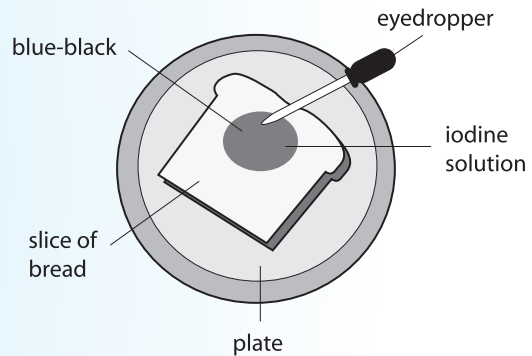


Diagram 2

Discussion

- What are the two types of carbohydrates? Give examples of each.
- Which samples contained complex carbohydrates? How could you tell?
- Why is it important to add more whole grains to your diet?

Extension

- Research to find out more about carbohydrates. Explain why athletes need more complex carbohydrates in their diets.
- Test additional foods for complex carbohydrates.
- Conduct research to find a test for simple sugars.
- Plan a healthy diet that includes both simple and complex carbohydrates.