

# Sugars and Starch

## Objective

To determine the kind of carbohydrate present in food samples using Iodine test and Benedict's test.

## Materials

Spot plate/egg tray  
Test tube  
Test tube rack  
Coffee stirrer/plastic spoon  
Alcohol lamp  
Tripod  
Wire gauze  
Beaker  
Match  
Test Tube holder  
Mortar & Pestle (optional)  
Labels/markers

Reagents:  
Iodine solution  
Benedict's reagent

Food Samples:  
Banana  
Cracker  
Milk  
Noodles  
Orange  
Rice  
Table sugar solution

## Reminders

- ✓ Check if your materials are complete. Notify your teacher at once if something is lacking.
- ✓ Avoid contaminating the samples.
- ✓ Do not mix samples in one container. (1 sample : 1 container)
- ✓ Do not switch the droppers from one reagent bottle/container with another.
- ✓ Do not place any food sample or reagent back to its original container.
- ✓ Do not taste/eat the food samples.
- ✓ All the reagents are toxic. Do not ingest them. In case of skin contact, wash thoroughly in running water.
- ✓ Place back the cover of the alcohol lamp when not in use.
- ✓ Keep flammable materials away from the lighted alcohol lamp.
- ✓ Never point the test tubes to anyone while heating them.
- ✓ Use a test tube holder to handle hot test tubes
- ✓ Set up the hot water bath as soon as you get your materials.

After the activity:

- ✓ Throw all solid waste in the "waste beaker" provided.
- ✓ Wash and thoroughly dry all glassware.
- ✓ Return all materials to the activity tray & ensure completeness.
- ✓ Clean as you go. Work area is wiped dry.

## Procedure

### A. Iodine Test for Starch

1. Place a small amount of food sample on the well of a spot plate/egg tray. Use one well for one sample and make sure that different food samples do not mix in one well. Describe each sample and record them in Table 1.
2. Add about 3 drops of Iodine solution on each food sample. Observe what happens and record them in Table 1.
3. The color of Iodine solution changes to blue-black in the presence of starch. Indicate which of the food samples contain starch by placing a positive sign (+) in the fourth column of Table 1.

Table 1. Iodine Test Results

<b>Food Sample</b>	<b>Before adding Iodine solution</b>	<b>After adding Iodine solution</b>	<b>Presence of starch</b>
Cracker			
Rice			
Noodles			
Banana			
Orange			
Milk			
Table sugar solution			

### B. Benedict's Test for Reducing Sugars

1. Place a small amount of food sample on a test tube. Use one test tube for one sample. Label properly each test tube.
2. Add about a dropper-full of Benedict's reagent in each test tube. Gently shake each test tube. Describe each sample and record them in the 2<sup>nd</sup> column of Table 2. You may use a white background for a clearer view of any color change.
3. In an empty test tube, place a dropper-full of Benedict's reagent. Describe the solution and record it in the 2<sup>nd</sup> column of Table 2.

**Q1. What is the purpose of preparing a test tube with only Benedict's reagent in it?**

4. Place all these test tubes in a hot water bath for 2 to 3 minutes. Observe what happens.
5. After heating, place the test tubes back to the rack. Describe each sample and record them in the 3<sup>rd</sup> column of Table 2.

6. The color of Benedict's reagent changes to green, yellow or orange/red, depending on the amount of reducing sugar present. Indicate which of the food samples contain reducing sugar and their relative amounts by placing a positive sign (+) for green, 2 positive signs (++) for yellow and three positive signs (+++) for orange/red, in the fourth column of Table 1.

Table 1. Benedict's Test Results

Sample	Before heating	After heating	Presence of reducing sugar
Cracker + Benedict's reagent			
Rice + Benedict's reagent			
Noodles + Benedict's reagent			
Banana + Benedict's reagent			
Orange + Benedict's reagent			
Milk + Benedict's reagent			
Table sugar solution + Benedict's reagent			
Benedict's reagent only			

Refer to Tables 1 and 2 to answer the following questions.

**Q2. Are starch and reducing sugars the same kind of carbohydrate? What made you say so? Use your results to support your answer.**

**Q3. Which food sample/s has/have the highest amount of reducing sugars?**

**Q4. Can one type of food contain different kinds of carbohydrates? Use your results to support your answer.**