

Identification of Sugars and Starches

Reminder – Goggles must be worn at all times in the lab

PRE-LAB DISCUSSION:

Carbohydrates include sugars and their polymers. The simplest carbohydrates are the monosaccharides; single sugars also known as simple sugars. Disaccharides are double sugars, consisting of two monosaccharides joined by condensation synthesis. The most prevalent disaccharide is sucrose, better known as table sugar. Its two monomers are glucose and fructose.

Complex carbohydrates are polymers (straight or branched chains) of simple sugars. Complex carbohydrates include the starches and cellulose. They are found as energy storage molecules in plants and animals, and are also prominent structural components in plants.

PURPOSE:

The purpose of the lab is to apply qualitative tests for the presence of simple sugars and complex carbohydrates.

PROCEDURE:

Your instructor will provide you with a number of different food substances. There will be a list of these on the board at the beginning of class. They will not be listed here in the lab, as the substances may change from year to year depending on what is in your teacher's fridge that day. Each of the substances is to be tested for the presence of monosaccharides AND complex carbohydrates.

PART A: Testing for Monosaccharides

1. Place a sample of a substance in a test tube. If it is too large a solid piece, cut it smaller. If you force it into the test tube, you may have difficulty getting it back out.
2. If the substance is in solid form, add enough water to create a solution. If the substance cannot be dissolved, add enough water to completely immerse the sample.
3. Add five drops of Benedict's solution to the tube.
4. Heat the test tube slowly and gently over a cool Bunsen burner flame, and observe any color change. A change from blue to reddish orange occurs if a monosaccharide is present. The color change will occur in stages, so be patient.

Blue → Green → Yellow → Orange

5. The original blue, or possibly a blue/green color will remain after heating if no monosaccharide is present. Record your observations in the Data Table. The conversion to an orange color confirms the presence of a monosaccharide.
6. Repeat this process for each of the substances available. Discard solids in the trash cans, and clean the test tubes thoroughly so the substance from an earlier test does not create a "false positive" in a later test.

PART B: Testing for Complex Carbohydrates (*Caution – Iodine is a stain!*)

1. Place samples of the substances to be tested into the wells on a CLEAN well plate (spot plate).
2. Put the well plate on a piece of white paper – the black lab tables make a poor background for observing the color differences between a positive and a negative test.
3. In an EMPTY well, drop several drops of the iodine solution so that you can observe the color of the iodine solution by itself.
4. The test is then done by dropping a single drop of the Lugol's iodine directly onto each sample.
5. If the color changes to black, it confirms the presence of complex carbohydrates. If the color remains that same as the unreacted iodine solution, then complex carbohydrates are not present.
6. After completing the testing, discard solids in the trash cans, and clean the spot plate thoroughly.

Results: (sample table – you will need more rows!)

Substance	Color change w/ Benedict's	Contains a mono-saccharide? (yes or no)	Color change w/ Lugol's Iodine Solution	Contains a complex carbohydrate? (yes or no)