Name_____Date_____Hour_____

Simple Food Tests: An Investigation into Macromolecules

Benedicts Test: A Test for Simple Sugars

Benedict's solution is used to test for simple sugars, such as glucose. It is a clear blue solution of sodium and copper salts. In the presence of simple sugars, the blue solution changes color to green, yellow, and brick-red, depending on the amount of sugar. Simple sugars like glucose, fructose and galactose can be found in fruits, vegetables, simple grains, and dairy products.

Lugo's Iodine: A Test for Complex Sugars

Lugol's iodine is used to identify the presence of starch. The solution is yellow-brown, but when it reacts chemically with starch it turns a blue-black color. Starches are polysaccharides that are made from simple sugars called monosaccharides, a starch molecule can be hundreds or thousands of sugars long. These super long sugar molecules are often found in pasta, cereals, and complex grains.

Caution: Observe proper laboratory safety. Iodine will stain be careful not to spill.

Biurets: A Test for Proteins

Biuret solution reacts with the peptide bonds found in protein molecules. Biuret reagent is a blue solution that, when it reacts with protein, will change color from blue to a pink or purple. Proteins are large polymers made from amino acids, and are found in animal flesh, nuts, and some dairy products.

Sudan III: A Test for Fats

Sudan III is used to identify the presence of lipids in liquids; it will stain fat cells red. Fats are large molecules used by organisms to store energy. Lipids are composed of long chains of carbon molecules and a glycerol molecule. Saturated fats are found in animal fats and have carbon chains that are "filled, or saturated" with hydrogen atoms. Unsaturated fats are found in many different oils from plant sources, unsaturated fats have double bonds in their long carbon chains. If a sample contains lipid molecules, the fats will be stained with a red color.

Material List

Test Tubes	Test Tube Rack	Benedicts Solution
Biuret Solution	Sudan (III) solution	Eye droppers

Procedure:

Part 1 Test for Simple Carbohydrates

1. Label 2 test tubes with your initials
2. Add 10mL of distilled water to each of the test tubes.
3. Add 10mL of glucose solution to one of the tubes filled in step 2. Carefully mix by covering the top with your thumb and inverting a couple of times.
4. Add 10 drops of Benedicts Solution to each test tube.
5. Carefully heat the test tubes by suspending in a hot water bath at about 40-50 degrees Celsius for five minutes.
6. Note any color change, add your observations to the data table. If sugar is, present solution will turn green, yellow, or brick red, depending on sugar concentration. A negative result the solution will remain blue.
7. Empty and rinse your test tubes when you are finished.

Part 2 Test for Complex Carbohydrates

1. Add 10mL of distilled water to two clean test tubes
2. Add about 10mL of starch solution. Cover the top with your thumb and invert to mix.
3. Add three (3) drops of Lugol's Iodine to each test tube sample. Agitate sample and mix thoroughly
4. Note any color change. If starch is present the solution will turn a blue/black color, a negative result will remain a yellowish brown.
5. Empty and rinse your test tubes when you are finished.

Part 3 Test For Proteins

1. Add 10mL of distilled water to two clean test tubes
2. Add to one of the test tubes, add one dropper full of egg white. Cover the top with your thumb and invert to mix.
3. Add 3 drops of Biuret reagent solution to each test tube.
4. Note any color change. Proteins will turn solution pink or purple, a negative test will remain blue in color.
5. Empty and rinse your test tubes when you are finished.

Part 4 Test for Lipids

1. Add 10mL of distilled water to two clean test tubes.
2. Add a small amount of vegetable oil to one of the test tubes. Put your thumb over the top of the test tube and shake vigorously for 20 seconds.
3. To each test tube add 5 drops of Sudan (III) solution.
4. Note any color change. A red-stained oil layer will separate out and float on the water surface if fat is present.
5. Empty and rinse your test tubes when you are finished.

Data Table

Test	Positive	Negative
Benedicts		
Iodine		
Biurets		
Sudan (III)		

Questions:

1. In each of the tests, one test tube served as the control. What solution did each of the control test tubes contain?

2. Which of the four macromolecules did we not test for in this lab?