



Testing for Carbohydrates, Lipids and Proteins

Name _____

Date _____

All living things contain organic macromolecules: lipids, carbohydrates, proteins and nucleic acids. All of these basic building blocks are made up of only a small number of elements: carbon, hydrogen, oxygen and nitrogen, sulfur and phosphorous. They are called macromolecules because they are made of long chains of carbon and hydrogen atoms and are often made of repeating smaller molecules bonded together in a repeating pattern called a polymer.

Macromolecule	Building block
Protein	Amino acid
carbohydrate	monosaccharaides
lipids	Glycerol + fatty acids

*It may be helpful to set up standards for students to compare the results to, since these tests are qualitative, rather than quantitative. Also, the shelf life of these indicators is limited. Buy fresh supplies often to ensure proper identification of the macromolecules.

Materials needed:

digital scale

Per table:

3g samples of:

soybeans, corn, flour, corn starch

your food sample (ground or crushed)

10 test tubes

1 Lab-aids® tray

1 mortar and pestle

1-4" x 4" brown paper (lunch bag or paper towels)

5 droppers

Sudan III

1 Lugol's Iodine solution

1 Biuret reagent solution

1 Benedict's solution

1-50 ml beaker distilled water

400 ml beaker for water bath

hot plate



Procedures:

Test 1: Test for lipids (fats and oils)

- a. Put 1 g of a crushed dry (or 1 drop of liquid) sample on brown paper. The presence of a “greasy” spot indicates lipids. Measure the diameter of your spot after 10 minutes. If you have a liquid sample, drop one drop on the brown paper and measure the spot after 10 minutes. You are looking for translucence.
- b. Test your liquid sample by putting 2 ml of the sample in a test tube with 2 ml of water. If you have a solid sample, grind it, measure out about 2 g and add 2 ml of water to it in a test tube. Add 3 drops of Sudan indicator to the test tube and shake. If lipids are present, you should see stained molecules.

For the following tests:

Mix 2 g of your crushed, dry food sample with 5 ml of distilled water in a test tube and mix well. This may take up to 2 minutes to mix thoroughly.

Test 2: Test for simple sugars such as glucose

Wear goggles for this procedure.

1. Add 40 drops of the liquid from the food sample mix to a test tube.
2. Add 10 drops of Benedict’s solution to the test tube; carefully heat in a hot water bath at 40-50 °C for 5 minutes.
3. If sugar is present the solution will change color. The scale shows relative amounts of sugars present, but **not** which specific sugars are present.
(nothing) blue → green → yellow → orange → red (lots)

Test 3: Test for starch. Use a tray for this test.

1. Place sample in small cup of tray.
2. Add 2 drops of Lugol’s Iodine solution to the sample.
3. If carbohydrates are present, the color will change from a yellowish brown to a dark purple, black.

Test 4: Test for proteins

- a. Place 40 drops of liquid food sample to be tested in a test tube.
- b. Add 3 drops of Biuret reagent solution to the test tube. Shake gently to mix.
- c. The presence of proteins will be indicated by a color change to purple. A color change to pink indicates peptides-short chains of amino acids.

Make a data table below or in your notebook, to collect your information.