Lipids, Proteins, and Carbohydrates Labs

More Evidence

While waiting for the DNA results from the strawberry, investigators discover a small amount of food residue near the incubator where the egg had been stored. Testing results indicated that the residue you found by the notebook is a carbohydrate.

During questioning, you learn what the four remaining suspects ate while working at the zoo: Maya had tuna, Noah had a hamburger and French fries, Eli had a hard-boiled egg, and Priya had rice with butter and sugar. Using the oil from the Maya's tuna, the potatoes from Noah's fries, the egg from Eli, and the sugar from Priya's rice, determine which suspect did not commit the crime.

Testing for Lipids

Materials:

- 1 brown paper towel
- 1 piece of egg (diced)
- 1 small scoop of sugar
- 1 drop of vegetable oil
- 1 piece of potato
- 1 drop of water

Procedure:

1. If a food that contains lipids is placed on brown paper, it will leave a spot that allows light to shine through. To test for lipids, divide one piece of a brown paper bag into 5 sections. Label the sections "vegetable oil," "glucose," "starch," "powdered egg whites," and "water."
2. In each section, rub a small amount of the corresponding substance on to the brown paper. With a paper towel, rub off any excess that may stick to the paper.
3. Set the paper aside for about 10–15 minutes until the spots appear dry. While you are waiting, answer questions 4–6 below. Then, continue with the tests on page 2.
4. Which substance or substances do you expect to test positive for lipids?
5. What is the purpose of testing water for lipids?
6. Why should you test all of the substances for lipids even if you believe that some of them do not contain lipids?

7. After all sections of the brown paper are dry, hold the paper up to a bright light or window. You will notice that at least one sample has left a spot on the brown paper that allows light to pass through. This type of spot indicates the presence of lipids.

8. Complete the last column of the data table on page 4 of this worksheet. Draw a plus sign in the boxes next to the samples that tested positive for lipids. Draw a minus sign in the boxes next to the samples that did not test positive for lipids.

Testing for Proteins

Materials:

- 1 eye dropper bottle of biuret solution
- 1 pipette
- 2 diced pieces of egg
- 1 small scoop of sugar
- 1 mL of vegetable oil
- 2 pieces of potato
- 1 mL of water

Procedure:

1. Label five clean containers with the following labels: “vegetable oil,” “glucose,” “starch,” egg whites,” and “water.” Add the amount of each substance listed above to the corresponding container.

2. Add 2 mL of water to each container. Stir the contents of each container to mix the water with each substance.

3. **CAUTION**: In this step, you will use biuret solution. Biuret reagent contains sodium hydroxide, a strong base. Be very careful not to splash or spill any. If you splash any biuret reagent on yourself, immediately wash it off with water and call your teacher for assistance.
   Use the biuret solution to test for protein in each substance. Biuret solution changes from blue to purple in the presence of protein. Add 20 drops of biuret solution to each container. Stir the contents of each container.

4. Record the color of each biuret solution in the data table on page 4. Draw a plus sign in the boxes next to the samples that tested positive for protein. Draw a minus sign in the boxes next to the samples that did not test positive for protein.

5. Carefully empty and rinse all containers thoroughly.

Testing for Carbohydrates

Materials:

- 1 beaker
- 1 hot plate
- 5 test tubes
- 1 test tube rack
- 1 pair of tongs
- 2 pipettes
- Benedict's solution
- 2 diced pieces of egg
- 1 small scoop of sugar
- 1 mL of vegetable oil
- 2 pieces of potato
- 1 mL of water

Procedure:

1. Create a warm bath.
    a. Place 250 mL of water in a beaker.
    b. Place the beaker on a hot plate.
    c. Set the hot plate to “warm.”

2. Set up the samples.
    a. Place one sample of each substance in its own test tube.
    b. Add 1 mL of water to each tube.
    c. Add 5 drops of Benedict’s solution to each tube.
    d. Place all tubes into the warm bath.
    e. Allow test tubes to sit for 15 minutes then remove them from the bath.
    f. Record the color of the solution in each test tube in the table below.

Positive results: brown, yellow, orange

Negative results: blue

Sample	Carbohydrate Tests		Protein Tests		Lipid Tests
	Test tube color	Glucose present	Biuret test color	Protein present	Lipid present
Vegetable oil					
Sugar (Glucose)					
Starch from corn or potatoes					
Powdered egg whites/piece of egg					
Water					