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| **Organic Compounds in Food** | | | | | | | |
| Food | Carbohydrate Test | | | | Protein Test | | Lipid Test |
| Test strip color | Glucose present | Iodine test color | Starch present | Biuret test color | Protein present | Lipid present |
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Lipid Test

1. Obtain five test tubes. Label each one of the following: distilled water, cooking oil, apple juice, gelatin solution, potato solution.

2. Use a graduated cylinder to transfer 5 mL of distilled water into the test tube labeled “distilled water.”

3. Repeat step 2 with each of the food substances. (Each test tube should have only one food item in it.)

4. Add 5 drops of Sudan III stain to each test tube.

5. *Gently* shake the contents of each test tube. **CAUTION**: Use extreme care when handling Sudan III to avoid staining hands or clothing.

6. Sudan III will dissolve in lipids and stain them red. In the Data Table, write a “+” if lipids are present or a “-“ if lipids are not present.

7. Wash the test tubes thoroughly. Move on to Procedure Part II.

Protein Test

1. Obtain five test tubes. Label each one of the following: distilled water, cooking oil, apple juice, gelatin solution, potato solution.

2. Use a graduated cylinder to transfer 5 mL of distilled water into the test tube labeled “distilled water.”

3. Repeat step 2 with each of the food substances. (Each test tube should have only one food item in it.)

4. Add 5 drops of Biuret Reagent to each test tube.

5. *Gently* shake the contents of each test tube. **CAUTION:** Biuret Reagent contains a strong base. If you splash any on yourself wash it off immediately with water.

6. Biuret Reagent changes color from blue to violet in the presence of protein. In the Data Table, write a “+” if protein is present or a “-“ if protein is not present.

7. Wash the test tubes thoroughly. Move on to Procedure Part II.

Simple Carbohydrate Test

1. Obtain five test tubes. Label each one of the following: distilled water, cooking oil, apple juice, gelatin solution, potato solution.

2. Use a graduated cylinder to transfer 5 mL of distilled water into the test tube labeled “distilled water.”

3. Repeat step 2 with each of the food substances. (Each test tube should have only one food item in it.)

4. Add 10 drops of Benedict’s Solution to each test tube.

5. *Gently* shake the contents of each test tube.

6. Place the test tubes in the hot water bath for 3-5 minutes. Remove the test tubes using test tube holders.

7. A rusty brown color in response to Benedict’s Solution indicates a large amount of simple sugars. An orange color indicates a moderate amount and a green or yellow color indicates a small amount of sugar. A blue color indicates no sugar present. In the Data Table, write a “+” if simple carbohydrates are present or a “-“ if simple carbohydrates are not present.

8. Allow the test tubes to cool and then wash them thoroughly. Move on to Procedure Part II.

Complex Carbohydrate Test

1. Obtain five test tubes. Label each one of the following: distilled water, cooking oil, apple juice, gelatin solution, potato solution.

2. Use a graduated cylinder to transfer 5 mL of distilled water into the test tube labeled “distilled water.”

3. Repeat step 2 with each of the food substances. (Each test tube should have only one food item in it.)

4. Add 5 drops of Iodine to each test tube.

5. *Gently* shake the contents of each test tube.

6. Iodine causes complex carbohydrates to turn dark blue or black. Substances without starch are colored brown by the iodine, but do not react with it. In the Data Table, write a “+” if complex carbohydrates are present or a “-“ if complex carbohydrates are not present.

7. Wash the test tubes thoroughly. Move on to Procedure Part II.

**Procedure Part II (GOGGLES MUST BE WORN FOR THE ENTIRE LAB PERIOD!)**

1. Share your results with the team members at your lab table. Your data table should now be complete for distilled water, apple juice, gelatin solution, potato solution and cooking oil.

2. Obtain an unknown substance from your teacher. Your teacher will tell you what the substance is. Using background knowledge, form a hypothesis that will state what macromolecules will be present in your unknown substance. Record your hypothesis on the answer sheet.

3. Perform the test you completed in Procedure Part I with your unknown substance. Use the same procedure, but only use the unknown substance. Record your data in the Data Table.

4. Once all groups at the lab table have completed the tests with the unknown substance, share your data.

5. Choose one member of the lab table to record all of the unknown data on the board. Record the data from the other two unknowns (on the board) in your Data Table.

6. Double check to make sure your station is clean and organized; then answer the analysis questions.

**Analysis & Conclusions**: Answer the following questions using complete sentences. Be thorough in your responses, using lab data when applicable

1. You are getting prepared to take a “Man vs. Wild” hike. Using your data and your understanding of nutrition, which of the unknown substances would provide the best fuel for your body to endure this long adventure? Explain.
2. Do the sugars in the apple juice need to be broken down by your digestive system before they can be utilized as an energy source for your body? Explain.
3. People with diabetes are instructed to avoid foods that are rich in carbohydrates. How could your observations in this investigation help you decide whether a food should be served to a person with diabetes?
4. What conclusion could you make if a positive test for any of the macromolecules occurred in the test tube containing only distilled water?
5. A very thin slice is removed from a peanut and treated with Sudan III stain. Then a drop of Biuret Reagent is added to the peanut slice. When you examine the peanut slice under a microscope, patches of red and blue-violet are visible. What conclusions can you draw from your examination?
6. You must save the world! Using your data and the information provided by the scientists (in the introduction), which of the unknown substances is the best defense against the undead? Why?

**Performance Assessment**

*One enslaved African told a free black in Charleston about the food eaten on the slave ship that brought him to America: "We had nothing to eat but yams, which were thrown amongst us at random--and of those we had scarcely enough to support life. More than a third of us died on the passage, and when we arrived at Charleston, I was not able to stand."*

Based on this information, infer a diagnosis of the slave’s physical condition upon reaching America. Apply your knowledge of organic compounds and the foods in which they are found to the causes of common diseases among slaves.