Lab Investigation – Organic Compounds

Background
Cells are composed of organic compounds or biomolecules such as carbohydrates, lipids, proteins, and nucleic acids. These substances are used by your cells and often obtained through the foods you eat.

Problem
Which foods contain carbohydrates, lipids, and proteins?

Hypothesis
Create a table in your lab report, like the one below, that shows your predictions about which foods contain simple sugars, complex sugars, lipids, and proteins.

<table>
<thead>
<tr>
<th>Food</th>
<th>Simple Sugars</th>
<th>Complex Sugars</th>
<th>Lipids</th>
<th>Proteins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple juice</td>
<td></td>
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<tr>
<td>Potato juice</td>
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<tr>
<td>Liquid margarine</td>
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<tr>
<td>Egg whites</td>
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<tr>
<td>Fish puree</td>
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<tr>
<td>Egg yolks</td>
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</tr>
</tbody>
</table>

Materials
- lab apron
- safety goggles
- gloves
- newsprint paper or brown paper towel
- test tube rack
- test tubes
- test tube holder
- Benedict’s solution
- Biuret’s solution
- Lugol’s solution
- apple juice
- potato juice
- liquid margarine
- egg whites
- fish puree
- egg yolks
- disposable pipettes
- masking tape
- boiling water bath
- spot plate or paper plate
- simple sugar solution
- complex sugar solution
- lipid solution
- protein solution
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Procedures – Testing Controls
1. Label two test tubes SS+ and SS- (for simple sugar positive and simple sugar negative).
2. Place 10 drops of water in the test tube labeled SS-. Place 10 drops of simple solution in the test tube labeled SS+.
3. Add 10 drops of Benedict’s solution to each test tube.
4. Place the test tubes into a boiling water bath for two minutes.
5. Any color change from blue (the color of Benedict’s solution) indicates a positive test for simple sugars.
6. Record your data.
7. Label two test tubes CS+ and CS- (for complex sugar positive and complex sugar negative).
8. Place 10 drops of water in the test tube labeled CS-. Place 10 drops of starch solution in the test tube labeled CS+.
9. Add four drops of Lugol’s solution to each test tube.
10. A color change from yellow/brown (the color of Lugol’s solution) to black indicates a positive test for complex sugars.
11. Record your data.
12. On a brown paper towel, label one side L+ and one side L- (for lipid positive and lipid negative).
13. Add 1 drop of water to the L- side and 1 drop of lipid solution to the L+ side. Allow the drops to dry.
14. A stain indicates a positive test for lipids.
15. Record your data.
16. Label two test tubes P+ and P- (for protein positive and protein negative).
17. Place 10 drops of water in the test tube labeled P-. Place 10 drops of protein solution in the test tube labeled P+.
18. Add 10 drops of Biuret’s solution to each test tube.
19. Place the test tubes into a boiling water bath for two minutes.
20. A color change from blue (the color of Biuret’s solution) to pink or purple indicates a positive test for proteins.
21. Record your data.

Procedures - Testing for Simple Sugars
1. Label test tubes for each of the foods to be tested.
2. Using the procedures above, conduct a test for simple sugars for each food.
3. Record your data.

Procedures – Testing for Complex Sugars
1. Label test tubes for each of the foods to be tested.
2. Using the procedures above, conduct a test for complex sugars for each food.
3. Record your data.
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Procedures – Testing for Lipids
1. Label test tubes for each of the foods to be tested.
2. Using the procedures above, conduct a test for lipids for each food.
3. Record your data.

Procedures – Testing for Proteins
1. Label test tubes for each of the foods to be tested.
2. Using the procedures above, conduct a test for proteins each food.
3. Record your data.

When you are finished with your tests, empty test tubes into an approved container and clean thoroughly. Throw away paper towels. Clean your lab area, and wash your hands.

Analysis
In writing your conclusion, compare your predictions to your results and consider the following questions.

1. What is the purpose of conducting positive and negative controls before you tested the foods?
2. Which compound is most common in foods that come from plants? Which compound is most common in foods that come from animals?