

Identifying Macromolecules Web Quest

Introduction:

The most common organic compounds found in living organisms are lipids, carbohydrates, proteins, and nucleic acids. Plants are able to make macromolecules on their own; however humans must eat to obtain macromolecules or the parts to build them. Common foods, which often consist of plant materials or substances made from animals, are combinations of these organic compounds.

Substances called *indicators* can be used to test for the presence of organic compounds. An indicator is a substance that changes color in the presence of a particular compound. In this investigation, you will use several indicators to test for the presence of lipids, carbohydrates, and proteins in various foods.



Problem:

What are the major types of organic compounds in some common foods?

Part 1: Working with Indicators

- ✓ Open a web browser & go to the following address: <http://bit.ly/7bmacrolab>
- ✓ Read the instructions on the page
 - What macromolecules will you be testing in this online lab?

- ✓ Click on **Carbohydrates**. According to the diagrams, what elements are found in carbs?

- ✓ Read the information in **red**:
 - How will Benedicts Solution tell you there is sugar present?

 - What type of sugar does Benedicts test for?

- ✓ Click to “fill a test tube with 2mL of water”. When the next page loads, click to “add 2mL of Benedicts reagent to the water”.
- ✓ Benedicts must be heated in order for the test to work. Click on the hot plate to heat the sample.
 - What color is the liquid in the test tube? _____
- ✓ Add monosaccharides to the test tube by clicking the “click here” next to the glucose solution.
 - What color is the liquid in the test tube? _____
- ✓ “Click here to continue”. Read the information in **red**:
 - The negative result is a _____ color. This means there is _____ present.
 - The positive result is a _____ color. This means there is _____ present.
- ✓ “Click here to continue”. You will now be testing for a larger carbohydrate (starch). Iodine is the indicator used to test for these polymers.
 - What color is the solution of iodine + water? _____
- ✓ Add starch to the solution by clicking on the box.
 - What is the color of the solution now? _____
- ✓ How do you know if a starch is present by adding iodine?
 - The negative result is a _____ color. This means there is _____ present.
 - The positive result is a _____ color. This means there is _____ present.

Great! Now you know how to test for Carbohydrates. "Click here to Continue".

- ✓ Click on **Proteins**. According to the diagrams, what elements are present in proteins? (Ignore the "R")

- ✓ According to the information in red, how will Biuret tell you there is protein present in a sample?

- ✓ "Click here to fill a test tube with 2mL of water". Read the information given to verify your answer above. Now "click here to add 2mL of Biuret"
 - What color is the solution? _____
- ✓ On the next page, click the bottle of protein solution to add it to your Biuret solution.
 - What color is the solution now? _____
- ✓ "Click here to continue". Read the information in **red**:
 - The negative result is a _____ color. This means there is _____ present.
 - The positive result is a _____ color. This means there is _____ present.

Great! Now you know how to test for Proteins. "Click here to Continue".

- ✓ Click on **Fats**. According to the diagrams, what elements are present in fats (lipids)?

- ✓ Read the information in **red**:
 - How will Sudan IV tell you there are fats (lipids) present?

- ✓ "Click here to fill a test tube with 2mL of water". Read the information given to verify your answer above. Now "click here to add 2mL of Sudan IV"
 - What color is the solution? _____
- ✓ On the next page, click the bottle of vegetable oil to add it to your Sudan IV solution.
 - What color is the solution now? _____
- ✓ How do you know if a lipid is present in a solution using Sudan IV?
 - The negative result is a _____ color. This means there is _____ present.
 - The positive result is a _____ color. This means there is _____ present.

Now that you know how to test for common macromolecules, complete the chart for a handy reference ☺

Macromolecule	Indicator Solution	Negative Result Color	Positive Result Color
Carb – Simple Sugars			
Carb – Starch			
Protein			
Lipid			

Part 2: Testing Foods

- ✓ From the start page, click on the “Foods” option.
- ✓ For each food listed (there are 6), complete the online tests. Each test will return a result. You must record the result in the appropriate space in the charts below. To do this, determine the color of the solution after it is added to the food. Record your results in TABLE A. Then, determine if that is a positive or a negative result; Record in TABLE B.

TABLE A: Color Test Results (indicate the color you saw for each test)

Food	Test for Sugar	Test for Starch	Test for Protein	Test for Fat
Potatoes				
Orange Juice				
Almonds				
Eggs				
Salmon				
Milk				

TABLE B: Positive or Negative Results (write YES for a positive result, NO for negative)

Food	Sugar	Starch	Protein	Fat
Potatoes				
Orange Juice				
Almonds				
Eggs				
Salmon				
Milk				

Analysis Question:

1. Suppose you put both Biuret and Sudan IV on a peanut and look at it under a microscope. You notice red & purple-ish spots on the peanut. What does this tell you about the peanut?

Conclusion:

Now that you have practiced using indicators and testing for macromolecules in various foods, you need to write a conclusion (Left side of NB). Review your findings and write a summary of what you have learned in this lab. Be sure to answer the problem question & discuss which foods tested positive for each macromolecule. Also, describe any problems or suggestions for the experiment. (*In other words, follow the lab format!!* ☺)