Macromolecules Review

Food is fuel:

All living things need to obtain fuel from something. Whether it is self-made through the process of photosynthesis, or by ingesting something & breaking it apart into its components.

YOU ARE WHAT YOU EAT!!!!!

What makes food?

All organic (naturally occurring, carbon containing) molecules are classified into 4 general categories

- Carbohydrate
- Protein
- Lipid
- Nucleic Acid

Foods you consume consist of these 4 molecules because the foods you eat come from living organisms. Let's take a look into the unique characteristics of these 4 categories.

1. Carbohydrates:

a. Sugars, starches (flour), grains.
b. Found in almost all food sources.
    i. Rice, cereal, potatoes, fruits, pasta, vegetables.
c. Main source of energy for body: need them to think, cells need carbs to function.
d. Easy energy source – easy for the body to break down
e. Simple vs. Complex carbohydrates
    i. Sugars are simple carbs – used up very fast (monosaccharides)
    ii. Fibrous foods have complex carbs – sustain you for longer (polysaccharides).

2. Lipids:

a. Fats, oil, lard, butter
b. Necessary to maintain membranes of cells
c. Also HUGE energy source but harder to break down
d. 2 types
    i. Saturated (solid at room temp) (all single bonds between carbons)
    ii. Unsaturated (liquid at room temp) (at least one double bond between carbons)

3. Proteins:

a. Beans, meat, green leafy vegetables
b. Necessary to maintain muscles
c. Proteins are part of almost everything in our bodies – (reaction catalysts, antibodies, hair, nails, muscle tissue, support of cells, "traffic cops" across cell membranes)

4. Nucleic Acids:

a. the genetic material
b. We consume the cells of an organism. Therefore we are also eating its DNA. We actually digest it. No, it does not become part of our DNA, but eating other organisms breaks down he DNA found in them into components so they can be "recycled".

Macromolecules Lab

Introduction

The most common organic compounds found in living organisms are lipids, carbohydrates, proteins, and nucleic acids. Common foods, which often consist of plant materials or substances derived from animals, are also 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

Pre-Lab Questions

1. What is a chemical indicator?

2. What are the 3 macromolecules you have taken notes on so far?
    a.
    b.
    c.

3. What is the difference between starch and glucose?

4. Proteins are made of amino acids. What atom is present in an amino acid that is not present in a sugar molecule?

5. Oils are unsaturated fats. What does it mean?

6. Are you supposed to mix the testing solutions?

7. Name 5 safety rules we should follow when completing this lab.
    a.
    b.
    c.
    d.
    e.

8. Name 2 indicators you will be using in this lab
    a.
    b.

Help! What Indicates What!?

Purpose: To determine the indicators or positive reactions for test reagents of the three major macromolecules (carbohydrates, lipids, proteins).

Materials:	**Test Solutions :**	**Indicators:**
Beaker	Protein solution	Biuret Reagent
4 Test Tubes	Oil	Benedicts Reagent
Hot Plate	Starch solution	Iodine
Pipette	Glucose solution	4 Brown Paper Bag Strips/Newspaper
1 Test Plate		
4 Stir Rods		
Test Tube Rack		
Masking Tape		

Procedures:

Part 1: Paper Bag Test

1) Place the 4 paper bag strips on table
2) Place a thin layer of only the protein solution on 1 paper bag strip (only one solution per paper: Do Not Mix Solutions)
3) Repeat step 2 for the other test solutions (Oil, Starch, Glucose, and Unknown X)
4) Allow to dry
5) Hold each paper up to the light (a positive indicator would allow light to shine through)
6) Log down results

Part 2: Benedict's Solution Test

1) Place 4 test tubes into the test tube rack
2) Label each test tube with masking tape (to indicate which test solution is in each test tube)
3) Using the pipet place about 1 cm of the protein solution into the test tube (only one solution per test tube: Do Not Mix Solutions)
4) Repeat step 2-3 for the other test solutions (Oil, Starch, Glucose, and Unknown X)
5) Add about 4 cm of Benedict's Solution to each test tube (all test tubes should be around 5 cm)
6) Place test tubes into heated water for 3-5 minutes

Part 3: Biuret Solution Test

1) Place 2-3 drops of the Oil test solution into a dimple on the test plate; make sure you know what test solution goes into each dimple
2) Place 2-3 drops of Biuret Solution into each dimple with the test solutions
3) Stir each dimple
4) Repeat step 2-3 for the other test solutions (Protein, Starch, Glucose, and Unknown X) only one solution per dimple: Do Not Mix Solutions.

Part 4: Iodine Test

1) Place 2-3 drops of the Oil test solution into a dimple on the test plate; make sure you know what test solution goes into each dimple
2) Place 2 drops of Iodine into each dimple with the test solutions
3) Stir each dimple
4) Repeat step 2-3 for the other test solutions (Protein, Starch, Glucose, and Unknown X) only one solution per dimple: Do Not Mix Solutions.

Results/Data:
Indicate any change in color, no reaction, slight reaction

	Biuret	Benedicts	Iodine	Paper
Protein				
Oil				
Starch				
Glucose				
Unknown X				

Post Lab Questions

1. What does Biuret reagent indicate the presence of? Explain.

2. What does Benedict's reagent indicate the presence of? Explain.

3. What does iodine indicate the presence of? Explain.

4. What does the paper test indicate the presence of? Explain

5. How could you improve the experiment to increase the validity of the results?

6. In a Claim, Evidence, and Reasoning paragraph explain what macromolecules sample Unknown X contains.