WLHS/Biology
Name_____Date_____Per____

PRELAB: BIOMOLECULE TESTING!

Purpose: What is the purpose of this lab?

Hypothesis: Generate a hypothesis based on the introduction that you have on the Biomolecule Lab. (Which foods will contain which biomolecules???)

Tests: Chemicals are used many times as indicators - that is, they show us if the presence of specific biomolecules can be found in given substances. This lab focuses on identifying three of the four biomolecules we have studied (carbs, lipids, proteins) using **INDICATORS****. Read the procedures for the Biomolecule Lab and complete the indicator table below.

INDICATORS are chemicals that react or change color in the presence of another compound…we use them to test for the presence (or absence!) of particular compounds.

Indicator / test:	Tests for presence of:	Original Color/Characteristic	Color/Characteristic it changes to if biomolecule present
Paper Towel	**Lipid**	**Wet**	**Grease Stain**
Sudan IV	**Lipid**	**Red**	**Darker Red**
Benedict	**Sugar**	**Light Blue**	**Orange/Rust**
Lugol (Iodine Solution)	**Starch**	**Brown/Black**	**Jet Black**
Biuret	**Protein**	**Blue**	**Purple/Violet**

LAB: Biomolecule Testing!!

INTRODUCTION:
One characteristic of life is that living things are made up of molecules containing carbon. These are called **ORGANIC MOLECULES**. In our class we have been referring to them as biomolecules since they are necessary for life. 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. Simple chemical tests with substances called **indicators** can be conducted to determine the presence of organic compounds. ***A color change of an indicator is usually a positive test for the presence of an organic compound.***

PURPOSE:
To use indicators to test for the presence of lipids, carbohydrates, and proteins in various foods.

MATERIALS:
Indicators (Biuret reagent, Benedict's solution, Lugol's solution, Sudan IV)
Food in bottles, 10 test tubes, beaker, hot plate, test tube holder, brown paper towel, 2 well plates.

PROCEDURE:

LIPIDS (2 tests)

TEST 1: Testing for Lipids: Part I

1. Tear off a piece of paper towel 30 cm long and put the names of your group members in the upper right hand corner.
2. Draw 6 small squares, approximately 3 cm each, and label each with the name of 1 of the foods (water, oil, milk, oatmeal, apple juice, and Unknown X).
3. Put 1 drop of each of the foods in the corresponding boxes on the paper towel.
4. Put the paper towel aside while you do the other 4 tests.
5. When the paper towel is dry, record your observations in the data table below.

TEST 2: Testing for Lipids: Part II

1. Put 1 mL full of each food (water, oil, milk, oatmeal, apple juice, and Unknown X) in 5 different test tubes. Make sure to LABEL all test tubes with a wax pencil.
2. Add 5 drops of **Sudan IV** into each of the solutions.
3. Observe and record all results in table below. (Look for a deep red color at the interface of the lipid with the dye; it may help to hold the tube over a piece of white paper.)
4. Wash all test tubes and place in test tube racks upside-down to dry.

CARBOHYDRATES (2 tests)

TEST 3: Testing for Starches

1. Fill 6 wells in your well plate: water, oil, milk, oatmeal, apple juice, and Unknown X. (see diagram)
2. Add 10 drops of **Iodine Solution** to each well.
3. Check for any color change and record data in table.
4. Clean and dry well plate

TEST 4: Testing for Sugars

1. Put 1 dropper full of each food (water, oil, milk, oatmeal, apple juice, and Unknown X) in 6 different test tubes. Make sure to LABEL all test tubes with a wax pencil.
2. Add 10 drops of **Benedict's Solution** to each test tube and place them all CAREFULLY into the hot water bath for 3-5 minutes.
3. Remove test tubes from hot water bath using designated tongs and place them into test tube holders. Note the color change and record into the table.
4. Wash all test tubes and place in test tube racks upside-down to dry.

PROTEINS (1 test)

TEST 5: Testing for Proteins

1. Fill 6 wells in your well plate: water, oil, milk, oatmeal, apple juice, and Unknown X. (see diagram)
2. Add 10 drops of **Biuret's Solution** to each well.
3. Check for any color change and record data in table.
4. Clean and dry well plate

**********CLEAN UP STATION AND HAVE TEACHER INITIAL THIS LINE FOR CREDIT ___X____**********

Diagram: 6 wells filled with the various substances.

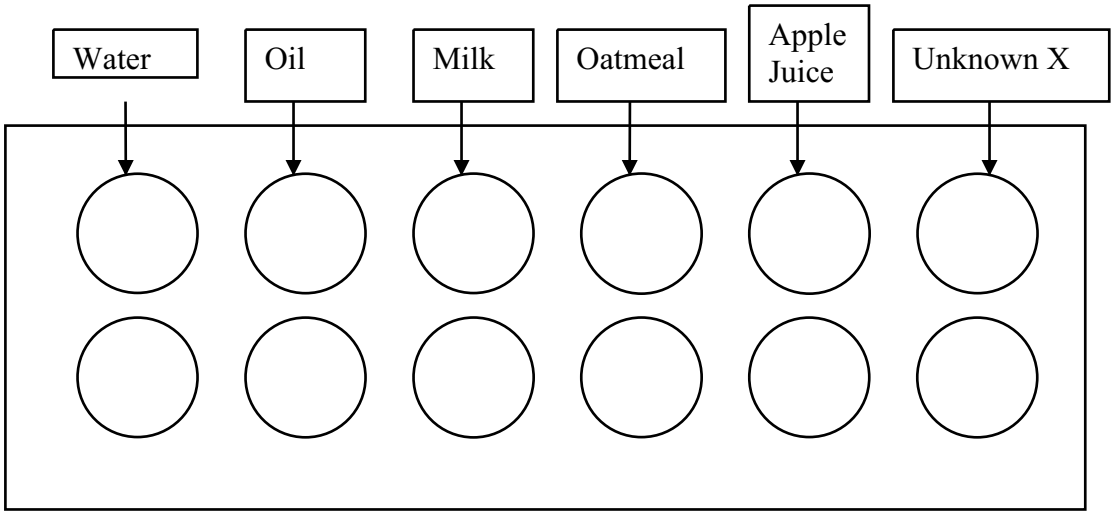

Table 1: Results from the testing of 5 solutions for organic compounds (carbohydrates, lipids, and proteins).

	Lipid Tests (2 tests)				Carbohydrate Tests (2 tests)				Protein Test (1)	
Substance	Spot or No spot	Lipid present (+)	Sudan IV Color	Lipid present (+)	Benedict Color	Sugar present (+)	Lugol Color	Starch present (+)	Biuret Color	Protein present (+)
Water	**No Spot**	**-**	**Clear**	**-**	**Bluish**	**-**	**Orange**	**-**	**Clear**	**-**
Oil	**Spot**	**+**	**Red Dots**	**+**	**Orange**	**+**	**Brown**	**-**	**Clear**	**-**
Milk	**Spot**	**+**	**White**	**-**	**White**	**-**	**Orange-yellow**	**-**	**White**	**-**
Oatmeal	**No spot**	**-**	**Darker pink**	**+**	**Yellow**	**-**	**Black**	**+**	**Yellow**	**-**
Apple Juice	**Not spot**	**-**	**Orange**	**-**	**Orange**	**+**	**Green**	**-**	**Yellow**	**-**
Unknown X	**Spot**	**+**	**Tan**	**-**	**Orange**	**+**	**Yellow**	**-**	**Purple**	**+**

Results:

1) Which test substances contained LIPIDS?_____

2) Which test substances contained STARCH?_____

3) Which test substances contained SUGAR?_____

4) Which test substances contained PROTEIN?_____

5) Which test substances did not test positive for ANY organic compounds?_____

POST LAB QUESTIONS – Biomolecules Testing

1) Which biomolecules (or types of biomolecules) did you test for in this lab?_____

2) What were the test substances (reagents) you used to the tests?_____

_____

3) What food substances did you test?_____

4) **Lipid "Spot" Test:**

a) What is the name of the test substance and what does it test for?_____

b) How do you know from the test that this biomolecule is present?_____

c) What were the results of the test?_____

d) What can you conclude from the results about the presence or absence of this biomolecule in each substance tested?_____

5) **Lipid Sudan IV Test:**

a) What is the name of the test substance and what does it test for?_____

b) How do you know from the test that this biomolecule is present?_____

c) What were the results of the test?_____

d) What can you conclude from the results about the presence or absence of this biomolecule in each substance tested?_____

6) **Carbohydrate Benedict" Test:**

a) What is the name of the test substance and what does it test for?_____

b) How do you know from the test that this biomolecule is present?_____

c) What were the results of the test?_____

d) What can you conclude from the results about the presence or absence of this biomolecule in each substance tested?_____

7) **Carbohydrate Lugol's Test:**

a) What is the name of the test substance and what does it test for?_____

b) How do you know from the test that this biomolecule is present?_____

c) What were the results of the test?_____

d) What can you conclude from the results about the presence or absence of this biomolecule in

each substance tested?_____

8) **Protein Biurets Test:**

a) What is the name of the test substance and what does it test for?_____

b) How do you know from the test that this biomolecule is present?_____

c) What were the results of the test?_____

d) What can you conclude from the results about the presence or absence of this biomolecule in each substance tested?_____

9) Summarize all of the positive test results

10) Describe anything that might have affected your results (sources of error).

11) Make a suggestion for improving the lab in the future.