Name: _____

Student Exploration: Identifying Nutrients

**Identifying Macromolecules**

Most food is composed of three types of molecules: **carbohydrates**, **proteins**, and **lipids**.

- Carbohydrates such as **starches** and sugars are major source of energy. Simple sugars are found in sweets and fruits. Starches are found in potatoes, cereal, pasta, flour, and other plant products.

- **Proteins** are used in body structures such as muscles, skin, and hair. Rich sources of proteins include meats, dairy products, and beans.

- **Lipids** (fats and oils) are used for energy, insulation, and as an essential building block of cells. Meats, dairy products, and oily plants such as olives are rich in lipids.

1. Below the **Food samples** label, drag tube **A** into the **Food sample holder**. Below the **Benedict test**, click the **Test** button. What is done in the Benedict test?

   _____

2. The **Benedict test** is a test for **monosaccharides**; simple sugars like glucose or fructose (fruit sugar). In contact with monosaccharides, the Benedict solution turns from blue to pink.

   Does **Sample A** contain monosaccharides? _____
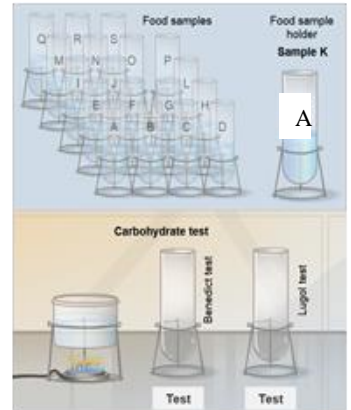
   Note: **Disaccharides** such as sucrose (table sugar) and lactose (milk sugar) are more complex than monosaccharides. The Benedict test does not detect disaccharides directly.

Question: How do you test for carbohydrates, proteins, and lipids?

3. The **Lugol** test uses iodine to test for starch, a **polysaccharide** (complex sugar). Iodine turns dark purple in the presence of starch.

   Under **Lugol test**, click **Test**. Does sample A contain starch? _____

4. The **Biuret** test uses a solution of potassium hydroxide (KOH) and copper sulfate ($CuSO_4$) to test for **protein**. The Biuret solution turns purple when proteins are present.

   Under **Biuret test**, click **Test**. Does sample A contain proteins? _____

5. **Sudan Red** is a fat-soluble dye that indicates the presence of **lipids**. When lipids are present, the dye will be absorbed into the lipids, and will appear as concentrated spots of color in the test tube. (No spots indicates that lipids are not present.)

   Under **Sudan Red test**, click **Test**. Does sample A contain lipids? _____

6. Summarize: What nutrients does sample A contain? _____

7. Analyze: What kind of food is sample A most likely to be? (Circle your choice)

   A. Apple juice   B. Baked beans   C. Oatmeal   D. Scrambled eggs

** Click **Reset** **

Question: What nutrients do your assigned food samples contain?

1. Use the four available tests to find the nutritional content of samples _____ *see Ms. Loree*. (Use Sample A for reference.) Record results on the table below.

Food sample	Carbohydrate Tests (+ /-)		Protein Test (+ /-)	Lipids Test (+ /-)	Test results – are these nutrients present? YES / NO			
	Benedict test	Lugol test	Biuret test	Sudan Red test	Mono-saccharides	Starches	Proteins	Lipids
A								

2. Look at the results for samples.

   A. Is your first sample _____ most likely to be steak, bread, butter or sugar? Justify your answer.

   _____

   B. Is your second sample _____ most likely to be table sugar, pasta, olive oil, or chicken? Justify your answer.

   _____

   C. Is your third sample _____ most likely to be beef, rice, mango, or butter? Justify your answer.

   _____

3. <u>Draw conclusions</u>: Why is it important to understand the nutritional content of food?

   _____

4. <u>Extend your thinking</u>: In general, a balanced diet contains relatively even amounts of carbohydrates, proteins, and lipids. Too much or too little of something can be harmful, but many diet fads recommend cutting out key nutrients like carbohydrates.

   Do you consider this to be healthy or safe? Why or why not?

   _____

   _____

   _____