

# BIG

## Biomolecules Lab

### PART 1: CARBOHYDRATES

#### Purpose:

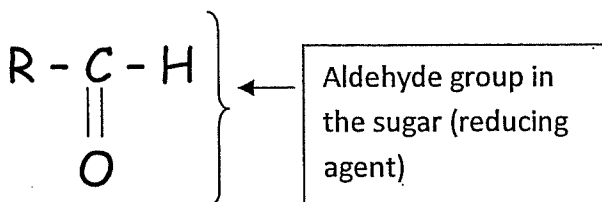
To determine the types of carbohydrates found in various foods.

#### Remember Carbs? Quick Pre-Lab Review

- Carbohydrates are composed of these THREE atoms- \_\_\_\_\_
- These atoms are in a ratio of \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_
- Carbohydrates are important as they provide \_\_\_\_\_ for most organisms
- They are a diverse group
  - The THREE monosaccharides are- \_\_\_\_\_
  - The THREE polysaccharides are- \_\_\_\_\_

#### Background Lab Info

- You can test for *reducing sugars* (i.e. monosaccharides & some disaccharides) using **Benedict's Solution**.
- What the heck is a *reducing sugar*??? A **reducing sugar** is any sugar that either has an aldehyde group or is capable of forming one.



- So, how does the **Benedict's Solution** work? The aldehyde group in some of the sugars are oxidized by the metallic ions ( $\text{Cu}^{+2}$ ) present in the Benedict's solution ( $\text{Cu}^{+2}$  is reduced to  $\text{Cu}^{+1}$ ). The reaction results in a **coloured precipitate** forming!! (copper (I) oxide).
- You can test for a *complex carbohydrate* (i.e. starch) using an **Iodine Solution**. A black/inky blue precipitate will indicate a positive test.

#### Materials

1% glucose  
~~1% fructose~~  
1% maltose  
1% sucrose  
~~1% glycogen~~  
1% starch  
10% corn syrup

skim milk  
carrot extract  
potato extract  
iodine solution  
Benedict's solution  
distilled water

#### Equipment

10 mL graduated cylinder  
test tubes (medium)  
400 mL beaker  
spot plate  
hot plate  
test tube rack

## What do we do?

### A. Testing for Simple Sugars

Place 3 mL of each solution or extract in a separate test tube. Put 3 mL of distilled water in another test tube as a **control**. To each test tube add ~5 drops of Benedict's solution. Heat the mixtures in a **hot water bath** for 2-3 minutes & observe any colour changes you see.

### B. Starch and Glycogen Test

Place 5 drops of each solution or extract on a spot plate. Put 5 drops of distilled water on the plate as a **control** sample. Add 1 drop of iodine solution to each sample. Observe any colour changes other than that due to the iodine solution.

## Observations

Construct a table similar to the one shown below on a separate piece of paper. You will need 2 tables (one for each test).

### Example Table...

#### A. Benedict's Test

| Sample | Observations | Conclusions |
|--------|--------------|-------------|
| 1.     |              |             |
| 2.     |              |             |
| 3.     |              |             |

↓  
Cont...

## Questions

On the back of your data table sheet, record the answers to the following questions:

1. What are the structural differences among the three classes of carbohydrates? (mono-, di- & polysaccharides)
2. What is the structural difference between excess carbohydrates as they are stored in plants and in animals?
3. Explain why Benedict's solution gives a positive test only with *reducing sugars*?
4. Explain why the disaccharide *sucrose* gives negative test with Benedict's solution whereas *maltose* (also a disaccharide), gives a positive test.
5. Why is a distilled water sample necessary in procedures A and B?

## PART 2- PROTEINS

### Purpose

To determine the presence of proteins in various foods.

### Remember Proteins? Quick Pre-Lab Review

- Proteins are chains of \_\_\_\_\_ (the basic subunit)
- A key atom present in amino acids is \_\_\_\_\_

### Materials

10% egg albumin  
1% gelatin  
distilled water

milk  
chicken bouillon  
Biuret solutions

### Equipment

10 mL graduated cylinder  
test tubes (medium)  
eye dropper  
test tube rack

### Observations

Record your observations by making a similar table on a separate piece of paper.

### Example Table.

Type of Test: Biuret Test

| Sample | Observations | Interpretation |
|--------|--------------|----------------|
| 1.     |              |                |
| 2.     |              |                |

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Cont...

### Questions

On the back of your data table sheet, record the answers to the following questions:

1. What is a polymer?
2. What are THREE key functions of proteins in your body?
3. Describe the chemical composition of a lipid. Draw a basic diagram to illustrate its structure. \*Note: we will not be carrying out any testing in the lab for lipids.

