

# \*\*CLASS COPY!\*\*

## LAB 3: MACROMOLECULES IN FOODS – YOU ARE WHAT YOU EAT!

### INTRODUCTION:

The most common macromolecules found in living organisms are lipids, carbohydrates, proteins, and nucleic acids. Foods contain all of these substances in different combinations. These compounds can be detected by different chemicals that create a color change to indicate positive results or the presence of a certain compound. You will also test to see if lipid compounds are present using the grease spot test. Below, are the chemicals used and the macromolecules that each identifies.

### LAB SAFETY: GOGGLES MUST BE WORN FOR THE ENTIRE LAB PERIOD!!!

CAUTION: LIPIDS FROM FOOD SUBSTANCES AND IODINE CAN STAIN CLOTHING!

CAUTION: BIURET REAGENT IS A STRONG BASE (OPPOSITE OF STRONG ACID). IF YOU GET ANY ON YOUR SKIN, IMMEDIATELY WASH IT OFF WITH WATER & REPORT TO MRS. HI!

MACROMOLECULE	CHEMICAL/PROCEDURE	NEGATIVE TEST	POSITIVE TEST
Simple Carbohydrates (only monomers)	Benedict's Reagent	Stays blue	Yellow or orange-red
Complex Carbohydrates (only polymers)	Iodine Solution	Stays yellow-brown	Dark blue, black or purple
Lipids	Grease Spot Test	Liquid portion of substance evaporated; no grease spot	Grease spot left on brown paper after 15 minutes
Proteins	Biuret Reagent	Stays blue	Pink or violet

### MATERIALS:

<b>LAB SETUP MATERIALS</b> 10 Plastic cups Pipettes Hot plate, boiling water Q-tips	<b>TESTING CHEMICALS/MATERIALS:</b> Brown paper Benedict's Reagent Iodine Solution Biuret Reagent	<b>SUBSTANCES TO BE TESTED:</b> Distilled water White table sugar solution Vegetable oil Potato solution Egg whites Apple juice Whole milk Yogurt Chicken broth Honey
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### \*\*BEFORE STARTING YOUR LAB, HYPOTHESIZE WHAT YOU THINK HAPPEN FOR EACH FOOD TEST IN YOUR DATA TABLE!\*\*

### PROCEDURE:

#### SETUP:

- Pickup your group's numbered lab tray with the following on it: 10 cups, 1 piece brown paper
- Label the plastic cups (if they aren't already labeled) with the following:
 

Cup 1: Group #, Distilled (purified) H <sub>2</sub> O	Cup 6: Group #, Apple juice
Cup 2: Group #, White sugar solution	Cup 7: Group #, Whole milk
Cup 3: Group #, Oil	Cup 8: Group #, Yogurt
Cup 4: Group #, Potato solution	Cup 9: Group #, Chicken broth
Cup 5: Group #, Egg whites	Cup 10: Group #, Honey
- On your brown paper draw five boxes like so →
- Then label each box at the top with ALL the food substances

Water	Apple Juice			

## TESTING FOR LIPIDS: GREASE SPOT TEST

- **\*DO THIS FIRST AND LET IT SIT FOR AT LEAST 15 MINUTES!**
- **ONE AT A TIME**, obtain the beakers with the food solutions in them. **BE SURE NOT TO MIX THESE SOLUTIONS SO AS NOT TO MESS UP YOUR OR ANYONE ELSE'S RESULTS!**
- Using a q-tip, dip one **CLEAN** end in the food substance
- Streak the food substance on the brown paper in its correct box
- Flip the q-tip over to the **OTHER CLEAN** end, dip it in the next food substance, streak it on the brown paper, and throw the q-tip away.
- Continue this until you have all the food substances on the paper.
- Let the food substances dry for at least 15 to 20 minutes before making your observations.
- After 15-20 minutes has passed, observe each box. If a grease spot still remains, then lipids are present. If the liquid portion of the food substances has evaporated and does not leave a grease spot, then lipids are **NOT** present.
- **Complete your data table by putting a "+" for substances with a grease spot; or a "-" for substances that did not leave a grease spot.**

## TESTING FOR SIMPLE CARBOHYDRATES (ONLY MONOMERS): BENEDICT'S REAGENT

- **\*MRS. H WILL SET THIS ONE UP FOR YOU TO OBSERVE, BUT READ THE INSTRUCTIONS TO KNOW HOW IT WORKS!**
- Each food substances will be put in a labeled test tube. 10 drops of Benedict's solution will be added and mixed in.
- The test tubes will then be put in a bath of boiling water for approximately 5 minutes.
- After 5 minutes, the test tubes will be removed and ready for you to observe.
- **Complete your data table by putting a "+" for substances that changed to yellow or red-orange; or put a "-" for substances that stayed blue.**

## TESTING FOR COMPLEX CARBOHYDRATES (ONLY POLYMERS): IODINE SOLUTION

- **ONE AT A TIME**, obtain the beakers with the food substance in them. **BE SURE NOT TO MIX THESE SOLUTIONS SO AS NOT TO MESS UP YOUR OR ANYONE ELSE'S RESULTS!**
- Fill each labeled cup with its food substance to the black line on the cup (only about one pinkie-finger's worth!)
- On your lab tray is a dropper bottle labeled with an "I" for iodine. Add 5 drops of iodine to each cup.
- Gently swirl the cup to mix the iodine into your food substance.
- **Complete your data table by putting a "+" for substances that changed from yellow orange to black or dark purple.**
- Rinse the cup out thoroughly for your next test!

## TESTING FOR PROTEINS: BIURET REAGENT

- **ONE AT A TIME**, obtain the beakers with the food substance in them. **BE SURE NOT TO MIX THESE SOLUTIONS SO AS NOT TO MESS UP YOUR OR ANYONE ELSE'S RESULTS!**
- Fill each labeled cup with its food substance to the black line on the cup (only about one pinkie-finger's worth!)
- On your lab tray is a dropper bottle labeled with an "B" for Biuret Reagent. Add 5 drops of Biuret reagent to each cup.
- Gently swirl the cup to mix the Biuret reagent into your food substance.
- **Complete your data table by putting a "+" for substances that changed from blue to pink or violet purple.**
- Rinse the cup out thoroughly!

## CLEANUP:

- Make sure all your cups are rinsed completely for the next lab group! Put all your clean materials back on your lab tray and return it to the side counter. Dispose of any used materials (like q-tips, brown paper, etc.) Make sure as you clean up that the sinks are not a mess! Spray down your bench top and finish your lab questions.

**NEEDS TO BE REWRITTEN!**

**Setup List:**

**For day 1**

**Each lab group needs**

**a test tube rack with five test tubes and five caps  
pipette bulb of each chemical**

**For whole class:**

**Goggles!**

**Masking tape and sharpies**

**Hot water bath on hot plate**

**5 Erlenmeyer flasks of each of the following:**

**distilled water with pipette**

**vegetable oil with pipette**

**egg whites with pipette**

**sugar water with pipette**

**corn starch mixed in water with pipette**

**For day 2:**

**Each lab group needs**

**A test tube rack with six test tubes and six caps**

**Pipette bulb of each chemical**

**Erlenmeyer flask with distilled water and pipette**

**\*use to make own food solution and for distilled water control**

**Small beaker**

**spoon**

**For whole class:**

**Goggles!**

**Masking tape and sharpies**

**5 Erlenmeyer flasks of each of the following:**

**apple juice**

**potato solution**

**avocado solution**

**yogurt solution**

**use glucose for simple carbs! Sucrose does not work!!!**