

Food Science Workshop Test

A new processing plant opened with a complete line of sports drinks, juices and flavored waters. You are the quality control manager at the plant, and get a frantic phone call one afternoon. Someone has made a big mistake, putting all the drink base mixes into unlabeled containers! The products are:

Clean Pro contains sugar, whey protein **H₂Oh!** contains sugar, whey protein, starch
Fruiti-O contains sugar **Sweet T** contains sugar, starch

Your job is to figure out how to label all the containers correctly! You have at your disposal all the needed equipment and reagents for the Biuret, Benedict’s, and Iodine tests. Each test kit has instructions. You are free to use as many or as few tests as needed to find the right labels for the drinks.

Biuret Test

1. Put a little of each unknown in a different spot on the plate
2. Add a drop of NaOH to each & Add a drop of Benedict’s solution to each & Stir
3. Wait 10 minutes & Observe and record results in the table. (Purple is positive result)

Benedict’s test

1. Put a little of one unknown powder in a test tube & Add 5 drops Benedict’s solution to unknown
2. Using test tube holder, place test tube in hot water for 5 minutes
3. Observe results (Green, yellow, orange or red are positive reactions)

Iodine Test

1. Put a little of each unknown in a different spot on the plate
2. Add 1drop iodine to test tube for each unknown. Do not shake or swirl.
3. Observe. Blue or blue/black color is positive result

Results Table - After tests complete the following table and questions, then tell us which label is correct:

Sample#	Biuret	Benedict’s	Iodine	Correct label for beverage
	Pos (+), Neg (-)	-/+	-/ +	
U1				
U2				
U3				
U4				

1. What component did the Biuret test measure? _____
2. What metal salt is used in the Biuret reagent to form a complex? _____
3. What component does the Benedict’s Test measure? _____
4. What reason can you give for sample U4 reaction to the Benedict’s reagent? _____
5. What sugar could have been in sample U2? _____
6. What metal salt is used in the Benedict’s test? _____
7. What component did the Iodine Test measure? _____
8. How many experiments did you run? _____
Why? _____
9. What is the density of the cupcake/muffin on the table? _____
10. How much heat in Joules/gram does a Cheetos produce? _____

Fill in the following blanks.

- 11 There are ___ Calories/gram of fat.
- 12 There are ___ Calories/gram of carbohydrate
- 13 There are ___ Calories/gram of protein
- 14 There are ___ Calories/gram of water

Use the nutritional label given for information to answer the following questions:

- 15 Calculate the Calories in one serving of this product. _____
- 16 Calories from Fat _____
- 17 Calories from carbohydrates _____
- 18 Total Calories from Protein in one serving _____
- 19 What percent of the carbohydrate Calories come from fiber? _____
- 20 If the daily value of iron is 18 mg per day, calculate the amount (in mg) of iron one bar of this product _____
- 21 Some cupcakes were made that and each cupcake had a mass of 23.2 g. The cupcakes were put in an oven at 100 ° C until dry. The mass of each cupcake was then 14.9 g. What of the original mass of each cupcake was water? (Show your work)

Serving Size 1 bar (48g)	
Servings Per Container 12	
Amount Per Serving	
Calories 200	Calories from Fat 74
% Daily Value*	
Total Fat 8g	13%
Saturated Fat 2.5g	14%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 70mg	3%
Potassium 165mg	5%
Total Carbohydrate 26g	9%
Dietary Fiber 5g	18%
Sugars 11g	
Protein 8g	16%
Vitamin A 0% • Vitamin C 0%	
Calcium 2% • Iron 10%	

in
%

Formulation of mixes:

All the following can easily be made with ingredients found in the grocery store. These were prepared using 1-2% of each of the items.

- **Protein**
 - **Whey protein** can be found in the vitamin or supplement section or at a GNC or similar store.
 - **Egg white (liquid or powdered)** from fresh eggs or dried powder.
 - **Gluten** (sometimes found in the baking section with organic items)
- **Carbohydrate**
 - **Corn Syrup** (such as Karo brand) - fructose
 - **Pancake Syrup**- fructose
 - **Table sugar** – sucrose (won't react with Benedict's)
- **Starch**
 - **Corn Starch** – heat to boiling to dissolve starch, then cool before adding other ingredients.
 - **Potato flakes (Instant mashed potatoes)** –high in starch, also may get slight reaction with protein test

Clean Pro contains sugar (sucrose), whey protein **H2Oh!** contains sugar (corn syrup), whey protein, starch **Fruiti-O** contains sugar (pancake syrup) **Sweet T** contains sugar (pancake syrup), starch

	Biuret	Benedict's	Iodine	Correct label for beverage
Sample #	Pos (+), Neg (-)	-/+	-/ +	
U1	Pos (+)	Pos (+)	Pos (+)	H2Oh!
U2	Pos (+)	Neg	Neg (-)	Clean Pro
U3	Neg (-)	Pos (+)	Pos (+)	Sweet T
U4	Neg (-)	Neg	Neg (-)	Fruiti-O

1. What component did the Biuret test measure? Protein
2. What metal salt is used in the Biuret reagent to form a complex? Copper
3. What component does the Benedict's Test measure? Reducing Sugar
4. What reason can you give for sample U4 reaction to the Benedict's reagent? The sugar is not a reducing sugar
5. What sugar could have been in sample U2? Sucrose
6. What metal salt is used in the Benedict's test? Copper
7. What component did the Iodine Test measure? Starch
8. How many experiments did you run? 6

Why? **Once you know which ones contain protein and starch, you can deduce the rest**

9. What is the density of the cupcake/muffin on the table? _____
10. How much heat in Joules/g does Cheetos Produce? 5 Calories/g

Fill in the following blanks.

- 11 There are 9.5 Calories/gram of fat.
- 12 There are 4.1 Calories/gram of carbohydrate
- 13 There are 5.7 Calories/gram of protein
- 14 There are 0 Calories/gram of water

Use the nutritional label given for information to answer the following questions:

- 15 Calculate the Calories in one serving of this product. 228.2
- 16 Calories from Fat 76
- 17 Calories from carbohydrates 106.6

- 18 Total Calories from Protein in one serving 45.6
- 19 What percent of the carbohydrate Calories come from fiber? $5 \times 4.1 / 228 \times 100 = 9\%$

20 If the daily value of iron is 18 mg per day, calculate the amount (in mg) of iron in one bar of this product? $18 \times .1 = 1.8 \text{ mg}$

21 Some cupcakes were made that and each cupcake had a mass of 23.2 g. The cupcakes were put in an oven at 100 ° C until dry. The mass of each cupcake was then 14.9 g. What % of the original mass of each cupcake was water? (Show your work) (23.2-14.9)/23.2*100 = 35.8%

Nutrition Facts	
Serving Size 1 bar (48g)	
Servings Per Container 12	
Amount Per Serving	
Calories	Calories from Fat
% Daily Value*	
Total Fat 8g	13%
Saturated Fat 2.5g	14%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 70mg	3%
Potassium 165mg	5%
Total Carbohydrate 26g	9%
Dietary Fiber 5g	18%
Sugars 11g	
Protein 8g	16%
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 10%