**FOOD TESTS – CARBOHYDRATES (SUGARS AND STARCH)**

**AIM:** To identify reducing sugars, non-reducing sugars and starch in pure form and lunch sample. **Skill: ORR/MM**

**APPARATUS and MATERIALS:**

* 6 Test tubes
* Test tube holder
* Test tube rack
* Large beaker
* Bunsen Burner
* Glass rod/stirrer
* 2 syringes
* Benedict’s solution
* Dilute hydrochloric acid (HCl)
* Sodium hydroxide (NaOH)
* Iodine solution
* Distilled water
* Glucose solution
* Sucrose solution
* Starch solution
* Sample of lunch – rice/ bread/chicken
* Labels

**DIAGRAM:**

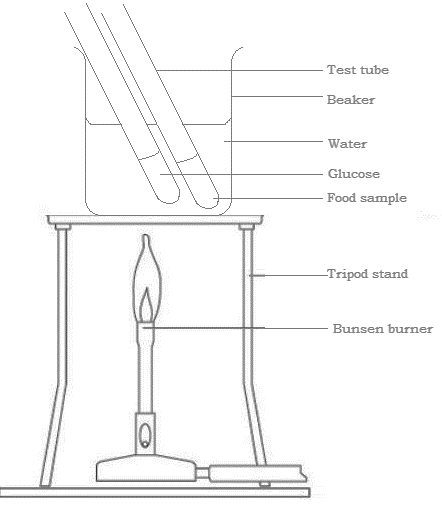


DIAGRAM SHOWING THE SET UP OF WATER BATH FOR REDUCING SUGAR TESTS.

**METHOD:**

**Benedict’s Test (Reducing sugar test):**

1. Label 2 test tubes – glucose and food sample.
2. Add 2cm3 of Benedict’s solution to 1cm3 of the glucose solution in the test tube labelled glucose
3. Place the test tube in a beaker of boiling water for about 2 minutes.
4. Observe and record the colours of the solution at the start and after the 2 minutes.
5. Repeat step 2- 4 using food sample crushed in water instead of the glucose solution.

**Non-reducing sugar test:**

1. Label 2 clean test tubes – sucrose and food sample.
2. Add 1cm3 of dilute HCl to 1cm3 of sucrose solution in the test tube labelled sucrose.
3. Place the test tube into the water bath for 2 minutes. Then remove and cool.
4. Add sodium hydroxide (NaOH) until the fizzing stops. (to neutralize any acid)
5. Add 2cm3 of Benedict’s solution and then place the test tube into the water bath for 2 minutes.
6. Observe and record the colours of the solution at the start and after the 2 minutes.
7. Repeat steps 2 – 6 using the food sample crushed in water instead of the sucrose.

**Starch test (Iodine test)**

1. Label 2 clean test tubes – starch and food sample.
2. Place 2cm3 of starch solution to the test tube labelled starch.
3. Add 2 drops of iodine solution to the starch solution, observe and record the colours.
4. Repeat steps 2-3 using food sample (either solid or liquid) instead of the starch solution.

*Rewrite your method into past tense in the space below or on a separate page.*

**METHOD**:

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**RESULTS:** (*Add a title to the table and record your colour observations for each food test.)*

**Table** showing \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **TEST** | **CONTENTS OF TEST TUBE** | **OBSERVATIONS**  **(ORIGINAL AND FINAL)** | **INFERENCE** |
| **BENEDICT’S TEST (REDUCING SUGAR)** |  |  |  |
|  |  |  |
| **NON-REDUCING SUGAR TEST** |  |  |  |
|  |  |  |
| **STARCH TEST** |  |  |  |
|  |  |  |

NOTE: An inference is a statement saying if the food substance (reducing sugar/ starch) is present or if the food substance is absent. OR that the observation is the positive for reducing sugar/ non-reducing sugar/ starch.

**DISCUSSION:** (On a new page, using full sentences in paragraphs)

1. What are food tests used to identify?
2. Name the reagents that are used to identify reducing sugars and starch.
3. Why is there a need for acid hydrolysis of sucrose before the Benedict’s test is conducted (Hint: sucrose is a disaccharide).
4. From your results what are the positive colour results that identify reducing sugars, non-reducing sugars and starch.
5. Based on your results what biomolecules/ food groups is present in the food sample tested?
6. What precautions did you take in conducting your experiment?

(Hint: Use a clean test tube and syringes for each test; do not cross contaminate food samples and pure form solutions. Make sure to neutralize the acid properly for the non-reducing sugar test. )

**CONCLUSION:** (ON A NEW PAGE - Relate to your aim and findings/results.)

See a sample below:

In pure form, reducing and non-reducing sugars cause Benedict’s solution to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; while starch causes iodine solution to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Food sample \_\_\_\_\_\_\_\_\_\_\_\_\_\_ contained \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, as observed by the positive colour results.

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| **MARKSCHEME – OBSERVING, RECORDING AND REPORTING ( ORR ) CRITERIA** | | **Mk** |
| **Observations** | * Significant changes noted * Original and final conditions compared * Control noted OR diagram | **3** |
| **Recording**  Tables/ Graph | * Title – above, in capitals - 1 * Column & row headings (with units) - 1 * Enclosed and neat -1   OR   * Title – at base, in capitals, underlined -1 * Both axes labelled with units - 1 * Accurate plots – 1 | **3** |
| **Reporting** | * Format - **ALL** sections present – 1 * Aim in capital letters - 1 * Acceptable language and expression –   grammar – 1 and spelling – 1 | **4** |
| **TOTAL** | | **10** |

|  |  |  |
| --- | --- | --- |
| **MARKSCHEME – MANIPULATION AND MEASUREMENT ( MM ) CRITERIA** | | **Mks** |
| Assembly of water bath | * Position tripod over bunsen * Position gauze on tripod * Correct placement of Bunsen and tripod in centre of desk | **3** |
| Beaker | * Select appropriate size beaker * 2/3 fill beaker with water * Place carefully on centre of gauze on tripod | **3** |
| Bunsen Burner | * Slide Bunsen burner out * Light Bunsen – turning on gas first * Adjust flame on Bunsen under tripod | **4** |
| **TOTAL** | | **10** |