**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**7CS Term 1 2022: Sugar Cube Dissolving Time Investigation** (Total Marks 25)

**READ THE FOLLOWING:**

**Background:**

Laura wants to make a jug of iced tea. She needs tea bags and hot water to make the tea. Laura wants to make this iced tea as fast as possible, but isn’t sure when to add the sugar – when the tea is hot, cold or somewhere in between.

You are going to do an investigation to find out if changing the water temperature changes the speed at which the sugar dissolves. Read through the following materials list and method then complete the investigation.

**Materials**

3 x sugar cubes

3 x 100mL beakers

3 x Stirring rods

1 x Thermometer

1 x Stopwatch

1 x Heat proof mat

1 x Measuring cylinder

Kettle – for teacher’s use

4 x 1L jugs containing 500mL of cold water to share for class - pipettes (for topping up cylinders)

**Method** Read carefully BEFORE starting !!!

Assign tasks to each team member as follows:

1. Student ONE - the cold-water beaker
2. Student TWO - the tap-water beaker
3. Student THREE – hot water beaker
4. Student FOUR – timing with stopwatch & recording results
5. Measure 80mL of cold water and pour into beaker one.
6. Measure 80mL of water from the tap and pour into beaker two.
7. Bring beaker three to your teacher for 80mL of hot water. Carefully carry this to your bench.
8. Measure and record the temperature of the water in each beaker **starting with the coolest.**
9. **At the same time**: students 1,2 & 3 drop one sugar cube into the beaker AND person 4 starts timing.
10. GENTLY stir the sugar solution until all of the sugar has dissolved. Record the time this took.
11. Rinse out your beakers and clean your station.
12. Repeat steps 1 to 7 two more times (if time allows) and record your results.

**PART A : BEFORE STARTING THE INVESTIGATION (7 minutes)**

**Sugar Cube Dissolving Investigation - *individual work under test conditions***

**Aim** **(1 mark)**

To find out at what water temperature sugar dissolves quicker (or similar)

Experiment is with water not tea

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**Variables**

Temperature of water (Temperature = ½ marks)

**Independent Variable (what changes): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 mark)**

Time taken for the sugar cube to dissolve

(Time = ½ marks) How long = ½ marks

**Dependent Variable (what is measured): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (1 mark)**

**Controlled Variables (what stays the same) list two (2): (2 marks)**

**Volume**/amount of water

Stirring speed

**Mass**/amount of sugar etc

EXPLAIN!! speed IS NOT the same as time ( ½ mark for speed)

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**Hypothesis** **(3 marks)**

*(Write a statement that describes the realationship between the independent and dependent variables)*

If the water temperature is increased then the time for the sugar cube to dissolve will decrease.

Indentifies I.V. = 1 mark. Identifies D.V. = 1 mark

uses if/then = ½ mark Uses decrease/increase appropriately = ½ mark

speed IS NOT the same as time ( ½ mark for speed)

F,T, MARKING FOR VARIABLES

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**PLEASE HAND THIS SHEET BACK TO YOUR TEACHER**

**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Team Members:**

**PART B: Sugar Cube Dissolving Investigation – group work**

**Materials**

3 x sugar cubes

3 x 100mL beakers

3 x Stirring

rods

1 x Thermometer

1 x Stopwatch

1 x Heat proof mat

1 x Measuring cylinder

Kettle – for teacher’s use

4 x 1L jugs containing 500mL of cold water to share for class - pipettes(for topping up cylinders)

**Method** Read carefully BEFORE starting !!!

Assign tasks to each team member as follows:

1. Student ONE - the cold-water beaker
2. Student TWO - the tap-water beaker
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5. Measure 80mL of cold water and pour into beaker one.
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7. Bring beaker three to your teacher for 80mL of hot water. Carefully carry this to your bench.
8. Measure and record the temperature of the water in each beaker **starting with the coolest.**
9. **At the same time**: students 1,2 & 3 drop one sugar cube into the beaker AND person 4 starts timing.
10. GENTLY stir the sugar solution until all of the sugar has dissolved. Record the time this took.
11. Rinse out your beakers and clean your station.
12. Repeat steps 1 to 7 two more times (if time allows) and record your results.

**Results**

**Complete the following table in PENCIL (4 marks)**

Title has I.V and D.V. 1 mark

**Title:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Temperature**  **of Water**  Units = ½ mark  **\_\_\_\_\_\_\_\_\_\_\_** | **Time for sugar to completely dissolve**  Units = ½ mark  **\_\_\_\_\_\_\_\_\_\_\_\_** | | | |
| **Trial 1** | **Trial 2** | **Trial 3**  **(if you have time)** | **Mean (Average)** |
|  |  |  |  | 1 mark  for calculating averages  CORRECTLY |
|  | 1 mark  for having temperatures | Have only 1 unit |  |  |
|  |  |  |  |  |

**Hand Part B to your teacher at the end of the lesson**

**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Team Members:**

**PART C:**

**Sugar Cube Dissolving Investigation- *individual work under test conditions***

**Diagram:** *(Draw a labelled scientific diagram to show how the equipment was set up.)* **( 3 marks)**

If done with pencil and ruler: 1 mark

½ mark each for drawing **and** labelling:

* Beaker A, B, C
* Water / Stirring rod
* Sugar cube
* Heat proof mat

***Analyse:*** *the data in the table and* ***State*** *what the results show?* **(2 marks)**

Sugar dissolved fastest in hot water ½ mark. Actual time = ½ mark

Sugar dissolved slowest in cold water ½ mark. Actual time = ½ mark

Or something similar.

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***State*** *whether the hypothesis was or was not supported and why using the data in the table.* **(2 marks)**

Uses words supported or ‘not supported’ = 1 mark

Refers to data in their answer to explain why = 1 mark

**D.N.R**

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**Evaluation**

1 mark for each valid reason

No:

* Stirring rate not consistent

OR

YES with 2 sets of justification regarding controlling variables

*Was it a fair test? (Explain why or why not)* **( 2 marks)**

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*What are 2 difficulties you experience during the experiment? Such as the way you measured or other things affecting the experiment.* ***Make 2 general suggestions*** *for improving this investigation.* **(2 marks)**

*Improvements*

1 marks for describing EACH valid improvements/solutions to the difficulties.

NO MARKS for ‘our group was mucking around’

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Safety**

*You were wearing safety glasses during this investigation.*

*List two more* ***different*** *things you did to ensure safety during this investigation.* **(2 marks)**

1 mark for any valid response.

1. Hair tied up
2. Use heat proof mat
3. Keep equipment away from edges

NOT ‘we behaved safely’ or ‘we followed instructions’

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

2. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**END OF ASSESSMENT**