**SAC: Practical investigation: Sucrose Experiment**

**Background**

Sucrose is a disaccharide produced in many plants. We are familiar with it as a natural sweetener but keep in mind that it is an organic chemical with chemical properties that can be tested.

**Aim**: To investigate the properties of sugars.

**Part A**: Properties of sucrose

**Materials**

Ignition tubes

Bunsen burner

Hand lens or microscope

Power supply

Ammeter

Carbon electrodes

Tongs

Sugar

**Procedure**

\*\*\*This experiment is best set up as a workstations – one task at each station means less equipment is required\*\*\*

**Crystal structure**

Use a hand lens to inspect sugar crystals.

Do they have a predominant shape?

**Solubility and conductivity**

1. Stir a spatula of salt into 50 mL of water in a beaker. Describe the solubility of salt.

2. Use a simple circuit with power supply, ammeter and two carbon electrodes to test the

 electrical conductivity of the salt solution.

3. Repeat for table sugar

**Flammability (Teacher demo limits mess)**

1. Use tongs and a fume cupboard to see if you can get a sugar cube to burn. Hold it in a

 Bunsen flame and then withdraw it if it seems to be burning.

2. Coat another sugar cube in a layer of fine ash (charcoal or activated charcoal) and try again.

Do you notice a difference?

**Heat resistance**

1. Fill one third of an ignition tube bulb with sucrose.

2. Heat it slowly and carefully in a Bunsen, observing each change in the sugar. Stop

 heating before large amounts of gas evolve.

3. Allow the ignition tube to cool to re-examine it. Record your observations.

**Part B**: Reactions of sucrose

**Materials**

Sulfuric acid 8.0M

Benedict’s solution

Test tubes

Bunsen burner

Tripod

Gauze mat

250 ml beaker

Sucrose

Dried yeast

Limewater

5% sucrose solution

5% glucose solution

**Sucrose and sulfuric acid**

1. Fill one third of an ignition tube with sugar.

2. **CAREFULLY** cover the sugar in a layer of concentrated sulfuric acid.

3. Watch the test tube over the next hour and record any changes.

**Sucrose and yeast**

1. Add two spoons of sugar to a flask of warm water.

2. Add some dried yeast to the flask.

3. Stopper the flask and run a tube from the flask through a beaker containing lime water.

4. Sit the apparatus on the window sill in a warm environment for a few days.

5. Record your observations.

**Sugars and Benedict’s Solution**

1. Add about 200 mL of water to a 250 mL beaker and heat on a tripod over a bunsen. This

 is your water bath.

2. Add 10 mL of glucose solution to a test tube.

3. Add 5 mL of Benedict’s solution to the test tube.

4. Sit the test tube in the beaker of hot water and boil gently for 10 minutes.

5. Prepare a second test tube using Benedict’s solution and 10 mL of sucrose.

6. Add this test tube to the water bath to boil gently with the other test tube.

7. Compare the colour changes occurring in the test tubes.

8. Record your observations

Clear record of all experimental results 10 marks

**Questions**

**1**. List three properties of sucrose.

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3 marks

**2**. Draw a molecule of glucose and a molecule of fructose showing all bonds.

 Circle and label all functional groups.

 Draw the products formed when the molecules react.

6 marks

**3.** **a**. What type of reaction is this?

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 **b**. Is mass conserved during this reaction? Explain your answer.

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3 marks

**4**. Explain the solubility of sucrose.

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2 marks

**5**. Explain the conductivity of sugar.

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2 marks

**6**. What is the role of the ash when burning the sugar?

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2 marks

**7. a**. What changes occurred when the sugar was heated?

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 **b**. How did the bonding change during the heating process?

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**c**. Is the change permanent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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 **d**. Write a possible equation for the reaction occurring.

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7 marks

**8**. What are the likely products of combustion of sucrose?

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1 mark

**9**. Write a balanced equation for the combustion of sucrose.

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1 mark

**10**. Write a balanced equation for the reaction occurring when sucrose is reacted with

 sulfuric acid.

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1 mark

**11. a**. How did the reactions of glucose and sucrose compare with Benedict’s solution?

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1. What is the significance of this reaction?

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4 marks

**12**. What are the products of fermentation?

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2 marks

**13.** **a**. Write an equation for the reaction occurring in the limewater.

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 **b**. Write an equation for the fermentation reaction.

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 **c.** The fermentation reaction features glucose, not sucrose. Describe one function

 of the yeast in the fermentation reaction.

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4 marks

**14**. Explain some safety precautions you have taken during this experiment.

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2 marks