Learning activity 5

Effects of amount of sugar on the quality of sponge cake

**Objective**

To investigate the effects of amount of sugar on the quality of sponge cake

**Principle**

Insufficient sugar will produce a less stable foam. The egg protein will not be elastic and tender. The cake will be less golden in colour and its texture will be less moist. Excess sugar will elevate the coagulation temperature of the egg protein. This may cause the cake to fall because air will be lost before the crust is formed. The texture will tend to be gummy and the crust pale and crystalline.

**Equipment & materials**

|  |  |
| --- | --- |
| **Equipment** | **Materials** |
| Scale  Mixing bowl  Electric mixer  Sieve  Whisk  Spatula  Cake mould  Baking paper | Amount of sugar:  Sample A 0 g  Sample B 50 g (control)  Sample C 100 g  (Refer to the recipe for the amount of sugar and other ingredients for each sample) |

**Procedure**

1. Prepare the three samples with different amount of sugar according to the recipe.
2. Observe the surface of samples.
3. Cut samples into halves and observe the cross section of each.
4. Compare results.

**Results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample** | **Volume** | **Colour** | **Texture** | **Moistness** | **Other observations** |
| A (0g) |  |  |  |  |  |
| B (50g) |  |  |  |  |  |
| C (100g) |  |  |  |  |  |

**Questions**

1. Which sample has the biggest volume?
2. What causes the moistness observed in Sample C?
3. What causes the texture observed in Sample A?

**Answers**

1. Sample B. Sugar increases the volume of baked product, but excessive sugar will lower the volume.
2. Sample C is moist. Sugar has water-retaining nature. The more sugar there is the higher moistness the product.
3. Sample A is not tender and bouncy, but it is dry. As sugar attracts moisture, baked product becomes soft. When there is little sugar, less tenderness and dryness is observed.

**Recipe: Sponge Cake**

**Ingredients (makes 2 6-inches cakes)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Batter* | |  |  | **Note:** | **Amount of sugar used (for** | |
| Egg | 3 (approx. 150 g) | |  |  | **experiment)** | |
| Sugar | 50 g | |  | Sample A | | 0 g |
| Low gluten flour | 50 g | |  | Sample B | | 50 g (control) |
| (cake flour) |  | |  | Sample C | | 100 g |
| Butter (melted) | 25 g | |  |  | |  |

**Preparation**

1. Pre-heat oven to 170oC.
2. Line 2 cake moulds with baking paper.
3. Sieve flour.
4. Melt butter.

**Procedures**

1. In a mixing bowl, beat egg with electric mixer at high speed.
2. Add 1/3 sugar when foam is seen. Continue to beat.
3. When sugar is dissolved, add another 1/3 of sugar. Continue to beat.
4. When sugar is dissolved, add the remaining 1/3 of sugar. Continue to beat until mixture becomes sticky. The volume should increase by approximately 4 times.
5. Sprinkle sieved flour gradually, and mix with a whisk. Stop when flour is not seen. Do not overmix.
6. Add hot melted butter, stir gently with a spatula. Make sure the butter at bottom of mixing bowl is also blended into the mixture.
7. Gently pour mixture into 2 cake moulds.
8. Bake at 170 oC for 15-18 minutes.