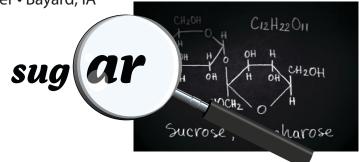
Sugar Detectives: Examining How Sugar Transforms Baked Goods



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Students work as detectives to identify sugar types and functions in baked goods through sugar research and preparing four recipes.

Students then persuade the "sugar thieves" of the importance of sugar.



Lesson Introduction: The sugar thieves have wreaked havoc in your kitchen! They don't think that sugar is important to baked goods. Could the thieves be right? You have 3 days to determine what functions sugar serve in the recipe and identify the sugar sources in your kitchen. If you can't convince them it is an important ingredient, then they will steal all your sugar!



Lesson Summary: Many people assume sugar simply adds sweetness, but sugar functions in sneaky ways to make our baked goods more than just sweet.

For this lesson, the students will determine how sugar is produced from sugar beets and cane and solve the mystery, "Why is sugar an essential ingredient in baking and how does sugar change the physical properties of baked goods?" Each group will prepare 4 different baked goods that use sugar in different ways. Students must detect what type of sugar was used and what purpose the sugar served in the recipe to change the physical properties of the baked good.

3 Day Lesson Objectives:

- 1. Identify and describe the functions of different types of sugars
- 2. Prepare recipes using different types of sugars and using sugar functions in a different way
- 3. Evaluate each baked good and identify what type and function sugar serves in the recipe

Family & Consumer Sciences Standards Nat'l Association of State Administrators of Family & Consumer Sciences, nasafacs.org)

8.0 Food Production and Services

- 8.2 Demonstrate food safety and sanitation procedures.
- 8.5 Demonstrate professional food preparation methods and techniques for all menu categories to produce a variety of food products that meet customer needs.

8.5.10 Prepare breads, baked goods and desserts using safe handling and professional preparation techniques.

9.0 Food Science, Dietetics & Nutrition

- 9.7 Demonstrate principles of food biology and chemistry.
- 9.7.1 Explain the properties, compounds, and mixtures in foods and food products.



Lesson Agenda:

Day 1: Introduction to Sugar Type & Function

Students identify different types of sugar and explain the functions of sugar.

Objectives:

- Distinguish between types of sugars commonly used in baked goods
- Describe each function and provide an example of a baked good that uses sugar
- Each group selects a "Secret Sugar Recipe" to accurately and cooperatively prepare

Materials:

Type of Sugars: Samples & Descriptions

Sugar Functions Chart

Day 2: Sugar Labs

Students prepare a recipe that uses sugar cooperatively in lab groups.

Objectives:

- Identify and explain the function(s) of sugar in the recipe
- Accurately measure all ingredients
- Prepare recipe using proper baking techniques

Materials:

Sugar Detective Recipes (4)

Sugar Detectives: Gathering the Clues Lab Preparation Sheet

Day 3: Sugar Function Detectives

Students sample the recipes prepared and question peers about their recipes. After gathering all the evidence (questions, recipe, and product), students must identify what the secret function(s) sugar played in each recipe and determine if sugar is an important ingredient in baked goods.

Objectives:

- Ask questions to peers about how sugar was used in their recipe
- Evaluate the product and recipe to select clues and determine what function sugar served
- Based on the answer and the recipes, detect what mysterious function sugar plays in each recipe

Materials:

Sugar Detectives: Evaluating the Evidence

Solving the Sugar Mystery: Type & Function of Sugars

Resources:

Home Baking Association

Providing Tools and Knowledge to Perpetuate Generations of Home Bakers

Sugar Detective Resources at HomeBaking.org

HomeBaking.org/distance-learning/

- Types of Sugars
- Where in the US Does Sugar Come From?
- Sugar Beet Processing
- Sugar Cane Processing



Sugar Association Resources Toolkit Grades 7-12

sugar.org/wp-content/uploads/
Toolkit_educators_7-12.pdf



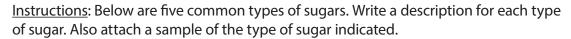
- 1. How to Bake a Loaf of Bread <u>homebaking.org/how-to-bake-a-loaf-of-bread/</u> and Hearth Bread, <u>kingarthurbaking.com/recipes/hearth-bread-recipe</u>.
- 2. Stafford, Gemma, Homemade Angel Food Cake, Bigger Bolder Baking, 6 May, 2021. biggerbolderbaking.com/angel-food-cake/
- 3. Heather. "Vanilla Cream Cake with Quick Caramel Frosting." The Cook's Treat, 8 Oct. 2019, thecookstreat.com/vanilla-cream-cake-withquick-caramel-frosting/
- 4. Frosting and Cake Baking Guide from Our Domino® Sugar Experts East Coast, Best Baking Guide Experience from C&H® Sugar West Coast, HomeBaking.org
- 5. Sally, et al. "Seriously Soft Molasses Cookies." Sally's Baking Addiction, 19 Dec. 2019, sallysbakingaddiction.com/soft-molasses-cookies/
- 6. Video, How to Measure for Baking, Liquid and Dry youtube.com/watch?v=OYU942728FM
- 7. Home Baking Association Glossary, sugar entries and links. home Baking Association Glossary, sugar entries and links. homebaking.org/glossary/#s

Types of Sugars: Samples & Descriptions

Name: ANSWER KEY Date: Points: /10

"Sugars" are mono- or disaccharides- simplex carbohydrates used in baking. In the past, sugar almost always referred to white granulated sugar derived from sugar cane. Today, sugar comes from both sugar cane and sugar beets. Sugars exist in various types and are used in a variety of ways to make baked goods delicious.

Explore More! Visit the Home Baking Association Glossary for more about sugar HomeBaking.org/glossary/#s or see Types of Sugar explained sugar.org/sugar/types/





Describe Granulated sugar with molasses. Dark or light brown in color.
Describe
Sugar cane is boiled and the juice is extracted. Syrup is then evaporated and concentrated. Sugar crystals start to form. Liquid is removed, stripped of color, and filtered Results: granules, clear/white in color.
<u> </u>
Describe a.k.a. "powdered sugar," granulated sugar that has been ground and added corn starch.
Describe
Sugar cane is boiled and juice is extracted. The longer the syrup is boiled, the darker and more caramelized the molasses is.
Describe
a.k.a "crystal sugar" or "decorating sugar," large grained granulated sugar. Raw sugar is also a coarse sugar and darker brown.

Sugar Functions Chart

Name: ANSWER KEY Date: Points: /10

Sugars provide sweetness and change the physical properties of a baked good. Depending on what techniques and ingredients are used, the sugar functions differently. The chart below includes the variety of functions that sugar can perform.

<u>Instructions</u>: Describe how each function is performed and provide at least one example of a baked good that engages the function. The first function is done as an example.

Need help? Check out **Sugar's Functions in Baked Goods** <u>sugar.org/resources/video/</u> or **How Different Sugars Affect Baking Goods** <u>chsugar.com/baking-tips-how-tos/how-different-sugars-affect-baking</u>

Sugar Function	Description	Examples of Baked Goods
Browning	Sugar in any form causes a brown color on the crust when baked. When the surface becomes hot, the sugar starts to caramelize.	Add milk to any product, most commonly yeast bread or pies. The lactose will aid in caramelization and browning.
Aeration	When granulated and brown sugars are creamed with fat, the batter aerates. Creaming fat & sugar promoted a light, fluffy product.	Cookies, bars, and some cakes
Tenderness	Sugar impairs starch gelatinization because it shortens the gluten strands.	Breads, cookies, cakes, bars
Moisture Retention	Sugar retains moisture in baked goods, especially when compared to products without sugar. Sugar can add moisture and it is hygroscopic, resulting in holding moisture and accesses moisture from the environment.	Candies: On humid days, sugar attracts and absorbs moisture from air resulting in gummy candies
Egg Foams: Tenderizer & Stabilizer	Sugar melts into the air cell of egg foams resulting in a more stable product. Sugar also raises the coagulation temperature; therefore, the egg foam is stable for longer prior to baking.	Meringues, egg foam cakes
Spread	Sugar increases spread in the oven when baking. Confectioner's sugar spread the least. Granulated and brown sugar spread at a medium rate. Sugar syrups result in a larger spread.	Cookies, bars
Fermentation	Yeast consumes sugar. Therefore, when baking with yeast, the yeast eats the simple sugar and releases gas to leaven the product.	Breads, rolls
Caramelization	When sugar is heated, the sugar browns and breaks down resulting in a unique texture and flavor.	Candies, caramel, crusts
Sweetness	Sugar provides a sweet flavor. The more sugar added, the sweeter the product typically	Almost all baked goods

Sugar Detectives: Gathering the Clues Lab Preparation Sheet

Name: ANSWER KEY Date: Kitchen: 1 2 3 4

<u>Instructions</u>: Before completing the sugar detective lab, answer the following questions.

1. Read through the entire recipe that you will be preparing in your lab. What questions do you have relating to the ingredients, measurement, or baking techniques used?

2. Circle the type(s) of sugar used in the recipe.

Confectioner's Sugar

Granulated Sugar

Brown Sugar

Molasses

Coarse Sugar



3a. What function do you predict the sugar serves?

3b. What clue(s) does the recipe give that indicates sugar's function(s)?