

## Chapter 42

### Baking Basics

# Yeast or No Yeast?

**Directions:** Read the following selection. Then answer the questions under *Thinking Critically*, and complete the activities as directed by your teacher.

What could be more appetizing than the aroma of bread baking? In addition to being a feast for the senses, bread dough made with a leavening agent such as yeast is an example of food science in action.

Yeast is a culture of microscopic fungi, or mushroom-like plants. These plants leaven by fermenting carbohydrates, such as glucose, fructose, maltose, and sucrose. *Fermentation* is an anaerobic chemical reaction in which complex, energy-rich compounds are broken down. (*Anaerobic* means that the reaction takes place in the absence of oxygen.) When carbohydrates are broken down by fermentation, carbon dioxide and alcohol are released. In turn, these create the lightness and flavor of the bread as the yeast organisms feed, grow, reproduce, and die in the rising dough.

Liquid at just the right temperature is required to start the reaction. Your textbook describes the quick-mix method for yeast-bread dough. In the conventional method, the yeast is combined with warm water first. The water should be 105°F to 110°F for active dry yeast, and 85°F for compressed yeast. Next, the fat, sugar, and liquid are heated, cooled slightly, and added to the dissolved yeast. Flour is then added to the mixture.

Bread dough rises due to the gluten in the flour. Scientists believe that gluten comes from two proteins in the endosperm of wheat. When flour is moistened and handled, the proteins interact to form gluten. Gluten molecules are initially long, coiled chains of amino acids with many kinks and folds.

In order for bread to rise, you need to develop the gluten thoroughly. The most common method for developing gluten is by kneading the dough. As the dough is worked, the gluten particles unfold and line up to form elastic sheets in the dough. These sheets trap the carbon dioxide released by the fermenting yeast. When you set the dough aside to rise, the trapped

gas expands, forming bubbles. The heat of the oven both sets the bread's structure and kills yeast, ending the reaction.

The gluten content varies in different types of flour. For yeast bread, high-gluten flour made from hard wheat (that is, varieties of wheat that have hard kernels) is ideal. For cakes and pastries, low-gluten flour from soft wheat is preferable.

Yeast is not the only leavening agent that can be used in bread baking. Salt, baking soda, and baking powder also act as leavening agents.

Salt-rising bread is leavened by the fermentation of milk and flour. Fermentation begins when cornmeal, salt, sugar, and scalded milk combine together. These ingredients function as a "starter" for the fermentation process. Once fermentation begins, fat, sugar, flour, and more liquids are added. Salt-rising bread requires warmth during fermentation and a longer baking time than yeast bread.

Baking soda, a mineral that pioneers in Utah found in large natural deposits, can also produce the carbon dioxide that makes bread rise. Carbon dioxide is produced when baking soda combines with a souring agent, such as sour milk or cream.

Baking powder, which was discovered just before the Civil War, contains its own souring agent. This mixture of bicarbonate of soda and tartaric acid was first manufactured in the 1850s by a company in Boston and was marketed as a substitute for yeast. The self-rising flours you may have noticed in stores contain baking powder.

Whatever means you use to make bread rise—yeast, baking soda, or baking powder—you will probably find the task worthwhile. Homemade bread makes any meal a feast.

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## Thinking Critically

1. In bread dough without gluten, what would happen to the carbon dioxide as it is released by fermentation?

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2. Why is low-gluten flour preferred for cakes and pastries?

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## For Further Study

- ◆ Expand on the yeast experiment on page 633 of Chapter 45 in your text to learn more about yeast and how this microorganism functions. Create variables in temperature, sugar content, and salt content. For example, after completing steps 1 and 2 of the experiment, repeat these steps using:
  - ◆ 2 Tbsp. sugar
  - ◆ 1 tsp. salt
  - ◆ ½ tsp. salt
  - ◆ omitting sugar or salt
  - ◆ a preheated oven
  - ◆ room temperatureDraw conclusions about how these changes may affect the action of yeast in bread dough. Summarize your findings and submit a written report to your teacher.
- ◆ Experiment with the fermentation process by making a fermented starter that can be used to make *Friendship Cake*. Use Internet or print resources, such as the University of Illinois Extension Web site, to locate a recipe for the starter. As you search for a starter recipe, avoid those that contain milk, eggs, or cream. Adding these substances to your starter can cause harmful bacteria to grow which can lead to foodborne illness. Creating starter is a 10-day process. After 10 days, the starter can be used to make *Friendship Cake*. Or, you can measure out one-cup amounts to give to your friends along with a set of instructions that explain how to nurture the starter and make the cake recipe.
- ◆ Research the history of bread baking. How did the ancient Egyptians leaven bread? The ancient Romans? Summarize your findings in a brief report to share with the class.