

# Principles of Baking

## OBJECTIVES

- Discover . . .**
- the purpose of ingredients in baking.
  - what happens during mixing and baking.
  - guidelines for successful baking.

Baked goods such as cakes and breads use basically the same ingredients. Their differences are caused by the amounts of the ingredients used and how they are put together and then baked.

In this chapter, you will learn information and skills that will be helpful for any baked product. You will put these general skills to work to make specific baked products in Chapters 39 and 40.

## The Chemistry of Baking

A recipe for a baked product is like a chemical formula. In fact, chemical reactions that take place during mixing and baking give the product its final appearance, texture, and flavor.

### What Ingredients Do

Each ingredient in baking has a specific purpose. They all work together to make a product with the desired texture and flavor. You will learn more about some of these ingredients as you study the rest of this unit.

**Flour** provides proteins and starch that make up the structure of baked products.

**Leavening agents**, such as baking powder, make products rise. They do this by causing air or gas to be trapped in the mixture. Without leavening agents, products would be flat with a dense texture.

**Understanding basic principles can help your baked goods turn out right.**



**Liquids** help flour form the structure of baked products. They also make possible many of the chemical changes which take place in the mixture. Water, milk, fruit or vegetable juice, yogurt, and sour cream are some of the liquids used in baked products.

**Fats and oils** make products rich and tender. They also add flavor and help to brown the crust.

**Sweeteners**, such as sugar, give flavor. They also help the crust to brown.

**Eggs** make baked products tender, add flavor and richness, and can help bind mixtures together so they don't separate. Beaten eggs may be used as a leavening agent.

**Flavorings** include chocolate, spices, herbs, and extracts such as vanilla and almond.



**Each type of ingredient in baking has a specific job to do.**

If you look at a recipe for muffins or other baked goods, you'll see most or all of these types of ingredients. If you use a convenience mix, some of the ingredients are already included in the mix. You add what's missing, such as liquid.

You have already learned how to buy and store some ingredients, such as milk and eggs. In Chapters 39 and 40 you will find consumer information for other ingredients.

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## How Ingredients Are Combined

The ingredients are combined and mixed in a specific way, depending on the type of baked product. Proper mixing helps give the desired texture.

The mixture of ingredients is called dough or batter, depending on how thick it is.



**Dough** is thick enough to be shaped by hand or cut into shapes. Biscuits, cookies, pie crust, and some breads are made from dough.



**Batter** is thin enough to be poured or dropped from a spoon. Pancakes, muffins, and cakes are made from batter.

One of the reasons for mixing ingredients is to distribute them evenly. Another is to develop gluten. *Gluten* is an elastic substance formed by the protein in flour. It forms the structure of the product. The more the dough is mixed, the stronger the gluten becomes. Some baked products, such as yeast bread, must have strong gluten. Others, such as cakes, do not need strong gluten.

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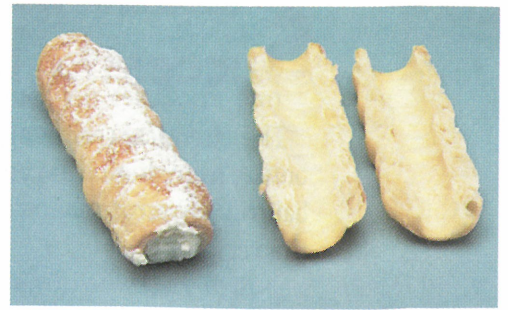
## How Leavening Agents Work

As mentioned earlier, most baked products need a *leavening agent* to help them rise. Recipes use one or more of these four basic leavening agents:

**Trapped air.** Air is trapped in a mixture when you sift flour, cream fat and sugar together, beat egg whites, or beat batter.



**Steam.** When steam is used as a leavening agent, the product must be baked at a high temperature. The high heat causes water in the mixture to turn to steam and the product rises. Cream puffs are an example.



**Chemical leavening.** There are two common chemical leavening agents—baking soda and baking powder. Baking soda forms carbon dioxide gas when it is combined with an acid. It is used in recipes that contain naturally acid foods, such as buttermilk, yogurt, or citrus juice. Baking powder is a combination of baking soda and a dry acid. It forms carbon dioxide when mixed with a liquid. Be sure to use the correct ingredient—baking soda or baking powder—called for in the recipe. They are not the same.



**Yeast.** Yeast is a microscopic plant that gives off gas as it grows. It reproduces quickly if it has warmth, food (such as sugar), and moisture. Yeast gives the baked product a distinctive flavor. It's the reason baked yeast bread smells and tastes so good.



Leavening agents work together with gluten. As the batter or dough is mixed, the gluten strengthens to form an elastic mesh. The air or gas from the leavening agent forms tiny cells or pockets within the mesh. When the batter or dough is baked, heat causes the air or gas to expand. The gluten stretches and the product rises. As baking continues, the heat causes the proteins and starch in the flour to set (become firm). As they set, they give the product its final shape.

**The action of leavening agents, gluten, and heat combine to give baked goods their final structure. The tiny holes in bread are spaces left by bubbles of gas produced by yeast.**



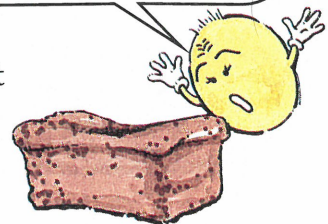
# Successful Baking

The chemical reactions that take place during baking are sensitive. They depend on the ingredients and amounts used, the way they are mixed together, and the baking temperature and time. Baking success depends on accurately following the recipe.

## Follow the Recipe

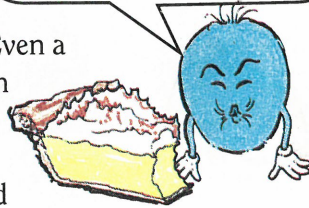
**Use the exact ingredients called for.** Different types of flour, fats and oils, sweeteners, and other ingredients are available. Each type gives a different flavor and texture to the finished product. If you substitute one type for another, the results may not be what you expect.

*What happened? All I did was use oil instead of shortening.*



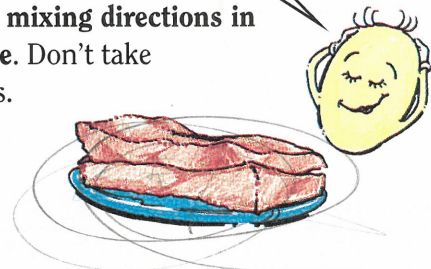
*I never thought a little extra lemon juice would make that much difference!*

**Measure accurately.** Even a few extra drops of an ingredient can make the difference between success and failure.



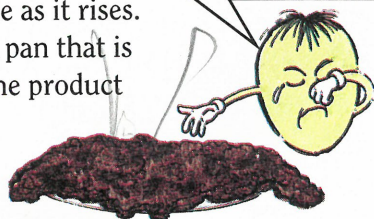
*I just threw everything in the bowl and mixed it up real good.*

**Follow the mixing directions in the recipe.** Don't take shortcuts.



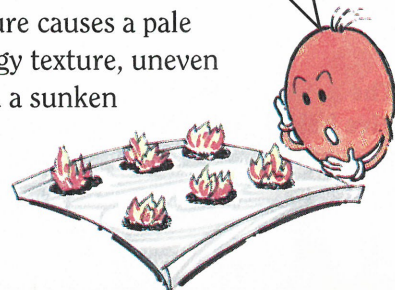
**Use the correct type and size of pan.** If you use a pan that is too small, the mixture will flow over the side as it rises. If you use a pan that is too large, the product will be thin and may not brown on top.

*I couldn't find the angel food cake pan, so I used this big pizza pan.*



**Use the correct oven temperature.** Too high a temperature causes overbrowning, poor volume, and a tough texture. Too low a temperature causes a pale color, soggy texture, uneven grain, and a sunken center.

*I thought if I turned the heat up the cookies would bake faster.*



## Setting the Oven Temperature

The correct oven temperature may depend on the type of pan you use. Some pan materials retain more heat than others. Unless they state otherwise, recipes are usually based on using shiny metal pans. If you use dull metal pans, lower the oven temperature about 10°F (6°C). If you use glass pans, lower the oven temperature about 25°F (14°C).

For best results, preheat the oven. About 10 minutes before you are ready to put the pan in, turn the oven control to the desired temperature. Preheating ensures that the oven will be at the correct temperature. The mixture will start to bake right away and will rise properly.



**Glass pans retain more heat than metal ones because they do not reflect the heat. Therefore, you must lower the oven temperature.**

## Preparing Pans for Baking

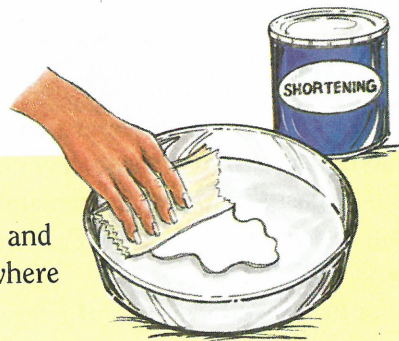
Pans must be properly prepared for baking. Otherwise the baked product may be difficult to remove. Follow the directions in the recipe. Some recipes call for greased pans, others for ungreased pans.

When greasing pans, use unsalted shortening or a cooking spray. The salt in butter or margarine could cause the crust to overbrown and stick to the pan.

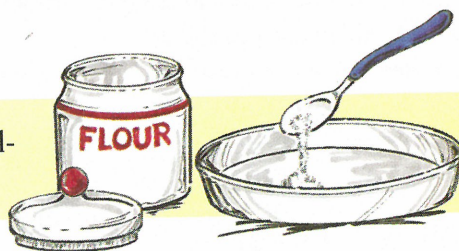
Some recipes call for greased and floured pans. The flour makes the product easier to remove. It also absorbs the fat and keeps it from soaking into the crust.

To grease and flour a pan . . .

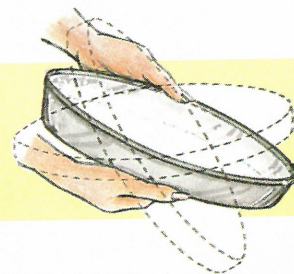
1. Using waxed paper or a paper towel, spread shortening in a thin, even layer over the bottom and sides of the pan. Be sure corners and the areas where the bottom and sides meet are well greased.



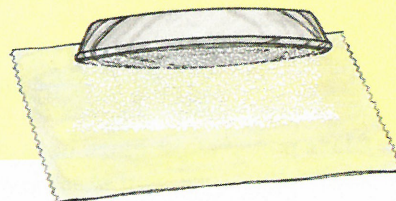
2. Sprinkle about 1 tablespoon (15 mL) all-purpose flour into the pan.



3. Hold the pan in both hands. Gently turn it at different angles to spread the flour evenly over the bottom and sides. Tap the pan gently to help spread the flour.



4. When the flour is spread evenly over the pan, hold the pan over a large piece of waxed paper. Turn the pan upside down and tap gently to remove excess flour.

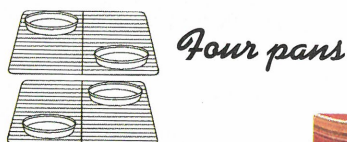
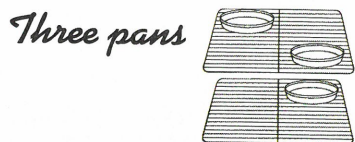
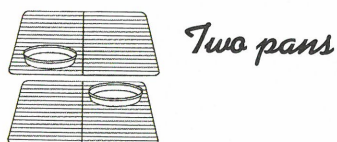


## Placing Pans in the Oven

Before placing pans in the oven, wipe off the pan sides and bottom. Food particles on the pan will burn.

In the oven, air must be able to circulate freely. If you are baking only one pan, place it in the center of the oven.

If you are baking several pans at a time, use two racks. Stagger the pans, as shown on the next page, so that one is not directly above another. Leave at least 1 inch (2.5 cm) space between pans and between the pans and oven walls.



## Removing Baked Products from Pans

The recipe should tell you when to remove the baked product from the pan. Some baked products should be taken out of the pans as soon as they are removed from the oven. Others must first cool for a few minutes. After products are taken out of the pan, they are usually placed on a wire rack or other surface to cool completely.



## Chapter 38 Review

### Check the Facts

1. Identify one function of each of the following ingredients: flour, leavening agents, liquids, fats and oils, sweeteners, eggs, and flavorings.
2. What is the difference between batters and doughs? Give an example of each.
3. What is gluten? How is it affected by mixing?
4. What are the four main types of leavening agents? Briefly describe how each works.
5. What are five general guidelines to follow when preparing any recipe for baked products?
6. Why should you preheat the oven?
7. If you were baking three pans at one time, how would you place them in the oven? Why?

### Ideas in Action

1. Find a recipe for a baked product such as bread, muffins, cake, or cookies. Does it include all seven types of ingredients discussed in this chapter? Explain.
2. Choose one of the principles of baking explained in this chapter. Make a poster using words and pictures to illustrate that principle.
3. Discuss the following: "I've watched my grandmother bake for years. She never measures anything—she just scoops out the ingredients. Her things turn out okay. Why should I bother to measure accurately?"
4. Prepare a demonstration on the proper placement of pans in the oven.