

# Bakeshop Ingredients

## OBJECTIVES

After reading this section, you will be able to:

- Explain the importance of using exact ingredients.
- Identify the different categories of ingredients and their roles in the baking process.
- Explain the role of flavorings, chocolate and cocoa, additives, and nuts in baking.
- List techniques used to mix batters and doughs.
- Describe the impact of carryover baking.

**FLOUR**, fat, sugar, milk, eggs, flavorings—from this simple list of ingredients, you can make an endless variety of baked products. Ingredients are more than just parts of a baking formula. They add flavor, texture, and visual appeal to all types of baked products. In this section, you will learn about basic baking ingredients and mixing techniques.

## KEY TERMS

- gluten
- crumb
- staling
- shortening
- hydrogenation
- leavening agent
- fermentation
- extracts
- batter
- dough



## ✕ USING EXACT INGREDIENTS

Baking, unlike cooking, leaves little margin for error. You can't just substitute the same amount of cake flour for bread flour and expect to come up with the same end result. To become a successful baker, you must understand how key ingredients work together. Baking formulas have been developed using exact types of ingredients. If the formula is not followed precisely, the product's texture and taste will be affected.

## ✕ WHEAT FLOUR

Wheat flour is the main ingredient in many baked goods. The proteins and starch in flour give these products structure. The classification of flour is based on the type of wheat it comes from—soft or hard. Hard wheat flour comes from kernels that are firm, tough, and difficult to cut. Bread flour is one type of hard wheat flour.

**Fig. 27-10.** Gluten gives dough its stretchiness, allowing it to be pulled and shaped. What other benefits does gluten give to dough?

Hard wheat has a high protein content. When wheat flour is mixed with water, certain proteins form **gluten**, a firm, elastic substance that affects the texture of baked products. The higher a flour's protein content, the more potential it has to form gluten. See Fig. 27-10.

Gluten is the substance that makes bread dough strong and elastic. Without gluten, you couldn't stretch the dough and hold in the gases that make it rise. The dough would collapse, resulting in poor volume and a coarse crumb. **Crumb** is the internal texture of a baked product.

Soft wheat flour, such as cake flour and pastry flour, comes from a soft wheat kernel. This type of flour has a low protein content, making it ideal for tender baked products such as cookies and pastries. Bread flour, cake flour, and pastry flour are all types of wheat flour.

- **Bread flour.** Bread flour is used for breadmaking. It has a high gluten-forming protein content. These proteins allow the bread to rise fully and develop a fine crumb. They also give the bread a chewier, firmer texture. Bread flour is used to make yeast breads, pizza, and bagels.

- **Cake flour.** Cake flour is lower in protein than bread flour and pastry flour. Cake flour produces a softer and more tender product than bread flour. Cake flour is bleached with chlorine (KLOR-EEN) to help produce a fine, white crumb in cakes.

- **Pastry flour.** The protein content of pastry flour is between that of bread flour and cake flour. It is used in pie dough, cookies, muffins, and quick breads. It is used for cakes only if cake flour is unavailable.

Other types of flours used in the bakeshop are listed in Fig. 27-11 on page 616.



## LIQUIDS

Liquids are an essential part of baking. The most common liquids used in baking are water, milk, and cream. Liquids can also be found in eggs, sugar syrups, and butter, which contains about 15% water.

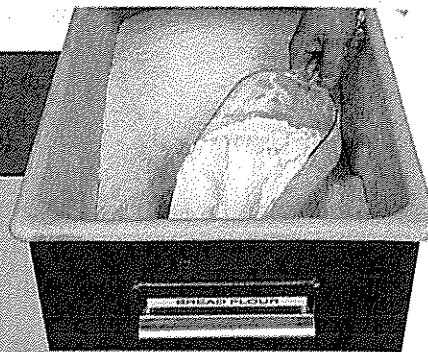
Accurate measurement of liquids is important because too much or too little can affect the outcome of the baked product. For example, adding too much water in pie dough will cause excess gluten formation, which may result in a tough texture.

- **Water.** Water is the most common liquid ingredient used in baking, especially for breads. It has many uses besides moistening dry ingredients. Water is necessary for gluten structure to form in flour. Also, water temperature is used to adjust temperatures. This applies to bread dough in particular, where dough temperature is important. Because water is tasteless, odorless, and colorless, it doesn't affect the flavor or color of baked products. It also adds no fat or calories.

- **Milk and cream.** Milk is another important liquid ingredient. Its protein, fat, and sugar content make it a valuable addition to baked products, ice creams, and custards. Milk also improves the flavor and texture of bread and other baked goods.

Fig. 27-11.

OTHER TYPES OF FLOUR	CHARACTERISTICS
<b>Whole wheat flour</b>	<ul style="list-style-type: none"> <li>• Dark flour made from whole wheat grains. Only the outer hull is removed.</li> <li>• Fine or coarse ground.</li> <li>• May be combined with bread flour or all-purpose flour for better volume and milder flavor.</li> <li>• High protein, but moderate gluten content.</li> <li>• Often combined with bread flour for better gluten structure in breads.</li> </ul>
<b>Cracked wheat flour</b>	<ul style="list-style-type: none"> <li>• Dark flour made from cut, not ground, whole wheat grains.</li> <li>• Usually soaked or partially cooked before adding to dough in order to soften the flour.</li> <li>• Must be mixed with bread flour or whole wheat flour when used in baked goods.</li> </ul>
<b>Non-wheat flours</b>	<ul style="list-style-type: none"> <li>• Whole or milled flours made from corn, rye, barley, buckwheat, oat, and other grains as well as from potatoes and soybeans.</li> <li>• Varying colors, textures, and gluten levels.</li> <li>• Usually mixed with bread flour to provide a better gluten structure.</li> </ul>



Some of these improvements include:

- Yielding a soft, rather than crispy, crust on items such as cream puffs or éclairs (ay-KLARES).
- Adding more color or flavor to crusts when applied to the surface of the baked product.
- Extending shelf life by delaying staling.

**Staling** is the process by which moisture is lost, causing a change in the texture and aroma of food. Staling causes the crumb to be dry and the crust to become soft and moist.

Dried milk solids are also used in baked goods. Since milkfat can reduce milk's shelf life, dried milk solids are usually purchased as nonfat dry milk. Nonfat dry milk can be reconstituted with water or used dry. If kept dry, it is easier to use and can be stored without refrigeration. You can sift it with dry ingredients or mix it with shortening, before adding the water separately.

Dairy products such as buttermilk, yogurt, and sour cream are also used in the bakeshop. These products contain live bacteria that convert milk

sugar into acid. The acid in buttermilk, for example, provides a whiter, more tender crumb in biscuits. See Fig. 27-12.

Another common dairy product, heavy cream, has a high fat content. This fat content allows it to tenderize baked goods. Cream is often whipped for toppings, chilled desserts, and fillings such as pastry cream. It's used as a liquid ingredient in custards, sauces, and ice creams. You will learn more about desserts in Chapter 30.

## FATS

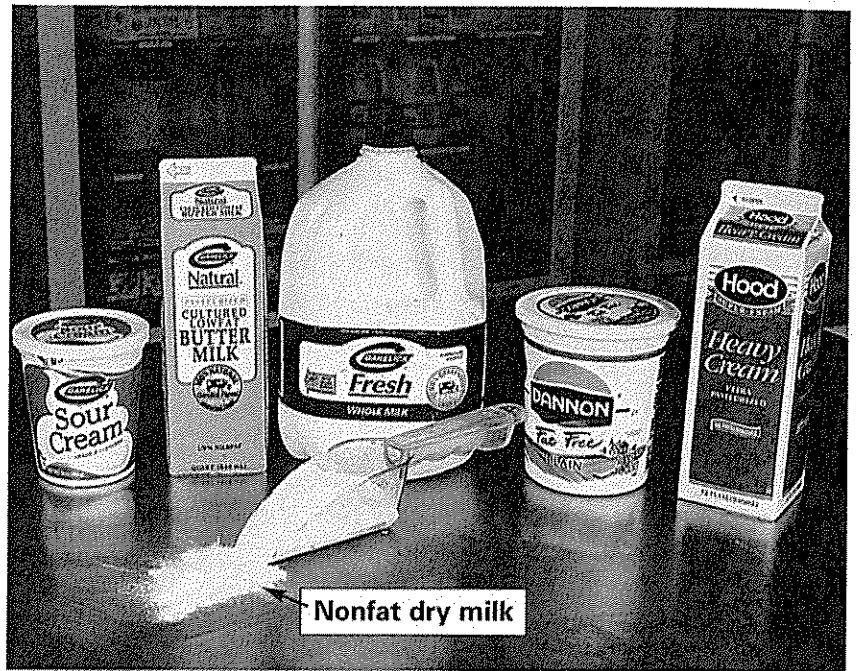
During the baking process, fats surround the flour particles and prevent long strands of gluten from forming. This tenderizes the baked good. Fats also add to the flavor, moistness, browning, flakiness, and leavening, depending on the type of fat. In baking, solid fats are referred to as **shortening**. Purified oils are made solid by a process called hydrogenation. **Hydrogenation**

**Fig. 27-12.** Milk and other dairy products help tenderize baked goods.

(hy-drah-juh-NAY-shuhn) involves making oils solid by the addition of hydrogen to the oil. The most common types of fat used in the bakeshop include all-purpose shortening, emulsified shortening, oil, butter, and margarine. See Fig. 27-13.

■ **Vegetable shortening.** When most people hear the word “shortening,” they think of a solid, white, flavorless fat used for baking. This type of shortening, known as vegetable shortening, is made from purified oils that have been hydrogenated to make them solid and less likely to become rancid. Vegetable shortening has a fairly high melting point, which makes it ideal for forming flaky pie doughs. It is also a good choice for frying and for making cookies and cakes.

■ **Emulsified shortening.** Some shortenings contain emulsifiers. Emulsified shortenings are also called high-ratio shortenings because they allow the baker to add a high ratio of water—and sugar—to a cake or icing. Some high-ratio shortenings look like all-purpose shortenings.



High-ratio liquid shortenings look like creamy oils. Some cake formulas are designed to use high-ratio liquid shortenings. These cakes will be extra moist, airy, and tender and will have a longer shelf life than cakes made with other fats. Other fats cannot replace high-ratio liquid shortenings because of their unique characteristics.

■ **Oil.** Oils are fats extracted from plants such as soybeans, corn, peanuts, and cottonseed. They are liquid at room temperature and neutral in flavor and color because they are highly refined. Because oil blends more easily throughout a mixture, it can coat more strands of gluten. Therefore, oil causes baked products to be more tender. Oil is used in quick breads, some pie crusts, deep-fried products like doughnuts, and rich sponge cakes like chiffon (shi-FAWN).



**Fig. 27-13.** Commercial bakeshops use many different types of fats in baking. Which of these fats might be used to make moist, airy cakes with a long shelf life?

## CULINARY TIP

**USING OIL INSTEAD OF SHORTENING**—Oil should never be substituted for a solid shortening. It will result in baked goods with lower volume and pie crusts that lack flakiness and crumble easily.

- **Butter.** Have you ever tasted a frosting that seemed to melt in your mouth? That frosting was probably made with butter. Butter can be purchased with or without salt. Unsalted butter is used in baking because of its pleasant flavor. Because butter is soft at room temperature, however, doughs made with butter are sometimes hard to handle. Butter is only 80% fat, so it produces a less tender baked product than shortening.
- **Margarine.** Margarine is typically a hydrogenated vegetable oil with color, flavor, and water added. Margarines have improved over the years. While they cannot match butter's superior flavor, they are less likely to spoil and are usually lower in saturated fat. Margarines can be purchased either salted or unsalted.

## X SUGARS & SWEETENERS

Sugars and sweeteners add a sweet, pleasant flavor to baked products. Flavor, however, is not their only contribution to baking. The other functions of sugars and sweeteners include:

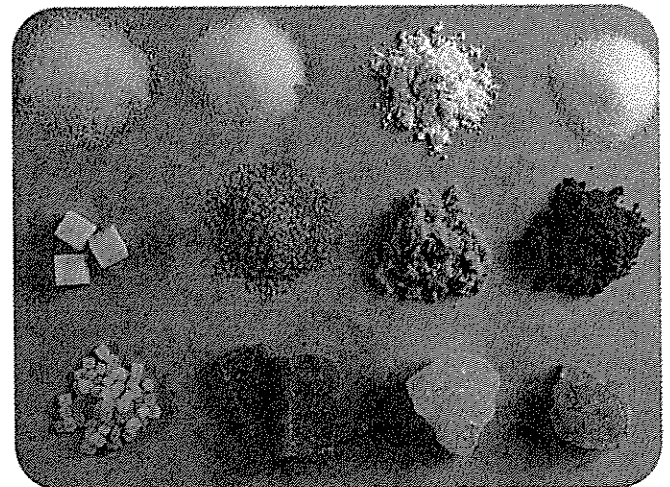
- Creating a golden-brown color.
- Stabilizing mixtures such as beaten egg whites for meringue (muh-RANG).
- Providing food for yeast in yeast breads.
- Retaining moisture for a longer shelf life.
- Tenderizing baked products by weakening the gluten strands and delaying the action of other structure builders such as egg protein.
- Serving as a base for making icings.

## Refined Sugars & Sweeteners

Sugar is produced from sugarcane or sugar beets. The cane or beet is crushed to extract the juice. The juice is then filtered and gently heated to evaporate the water. Through a series of heat-induced steps, the sugar is crystallized (KRIST-uh-lized), or turned into crystals, and separated from the dark, thick molasses that forms. It must be refined to produce sugar grains of various sizes. Various sugars and sweeteners are used in the bakeshop. See Fig. 27-14.

- **Molasses.** Molasses is the thick, sweet, dark liquid made from sugarcane juice. There are many grades of molasses available. Premium grades have a golden-brown color and a mild, sweet flavor. Lower grades are typically darker in color with a less sweet, stronger flavor. This stronger color and flavor is often desirable in baked products.
- **Brown sugar.** Brown sugar is a soft-textured mixture of white sugar and molasses. It can be light or dark in color. Store brown sugar in airtight containers to prevent moisture absorption.
- **Turbinado sugar.** Turbinado sugar is raw sugar that has been steam-cleaned. Its coarse crystals are blond colored and have a delicate molasses flavor. Turbinado sugar is used in some baked products and beverages.

**Fig. 27-14.** Many different types of sugars are used in baking. Try to identify each type of sugar shown here.



■ **Coarse sugar.** Coarse sugar, also known as sanded sugar, consists of large, coarse crystals that don't dissolve easily. It's used to decorate items such as doughnuts or cakes.

■ **Granulated sugar.** Regular granulated sugar is often referred to as extrafine white sugar or table sugar. It is the most common sugar used in the bakeshop. Granulated sugar is used in cooked icings, candies, and other baked products.

■ **Confectioners' sugar.** Confectioners' sugar, also known as powdered sugar, is granulated sugar that has been crushed into a fine powder. Confectioners' sugar also contains about 3% cornstarch, which helps keep the sugar from clumping. It is often used in uncooked icings and glazes and as a decorative "dusting" on baked products.

■ **Superfine sugar.** Superfine sugar is more finely granulated than regular white sugar. As a result, it dissolves almost instantly. Superfine sugar is perfect for making sweetened cold liquids and egg white meringues less gritty. Meringues can be used for such items as toppings on pies.

■ **Corn syrup.** Corn syrup is produced from the starch found in corn. The starch granules are removed from corn kernels and treated with acids or enzymes to create a thick, sweet syrup. Light corn syrup has no color, while dark corn syrup has a molasses-like flavor. Corn syrup does not crystallize easily, so it is a popular ingredient in frostings, candies, jams, and jellies.

■ **Maple syrup.** Maple syrup adds a unique flavor to baked products. It is made from the sap of a maple tree. Syrups are graded according to their color and flavor. The lighter and milder the syrup, the higher grade it will receive.

■ **Honey.** Honey is a thick, sweet liquid made by bees from flower nectar (NECK-tur). The type of flower affects the final flavor and color of the honey. Honey is widely used to give baked products a distinct, sweet flavor. It should be stored in a cool, dry place. Refrigerated honey will crystallize and form a gooey mass. If this happens, the honey can be heated in the microwave in small amounts or in a pan of hot water over low heat.



Fig. 27-15. Different forms of eggs fit the varying needs of commercial bakeshops.

## ✕ EGGS

Eggs are the second most important ingredient in baked products. Eggs come in a variety of sizes. Formulas listing the amount of eggs by number instead of weight have based the formula on large eggs, which weigh about 2 oz. each.

Commercial bakeshops use egg yolks instead of whole eggs when a richer, more tender product is desired. They also use egg whites in place of whole eggs when baking low-fat products.

### Forms of Eggs

Shell eggs and egg products, such as liquid frozen eggs, dried eggs, and liquid refrigerated eggs, are used in baking. Egg products can be purchased as whole eggs, egg whites, or egg yolks. See Fig. 27-15.

■ **Shell eggs.** Shell eggs are eggs sold in their shells. They are often called fresh eggs. If stored properly at 41°F or below, they will last up to four weeks beyond the packing date. Shell eggs are purchased in flats, each of which holds 2½ dozen, or 30 eggs. There are twelve flats in a case, meaning that one case contains 30 dozen or 360 eggs.

## CULINARY TIP

**EGG FRESHNESS**—You can tell whether an egg is fresh by putting the whole egg in a glass of water. If it floats, the egg is old.

■ **Egg products.** Egg products are eggs that have been broken, removed from the shell, and pasteurized. The whites can be separated from the yolks, and additives included if necessary. For example, frozen egg yolks have 10% sugar added to prevent them from gelling. The egg products are then packaged and refrigerated, frozen, or dried and packed in pouches.

Egg products are popular because of their convenience. They can be substituted for shell eggs in many baked products. Frozen egg products must be thawed in the refrigerator, so plan ahead when using them. Do not let them sit at room temperature, as egg products are highly perishable. Dried eggs are often used in prepared mixes such as for cakes. High-quality, dried egg whites are often preferred for making meringues over liquid egg whites because they are more stable.

### Functions of Eggs

Eggs serve a variety of functions during the baking process. These functions include:

- **Structure.** Because of their protein content, eggs give structure to baked products such as cakes. They also help thicken some products such as custard sauces.
- **Emulsification** (i-MUHL-suh-fuh-KAY-shun). Egg yolks have natural emulsifiers that help blend ingredients smoothly.

- **Aeration** (AR-AY-shun). Beaten or whipped eggs assist in leavening because they trap air that expands when heated, causing baked products to rise.
- **Flavor.** Eggs add a distinct flavor to baked goods.
- **Color.** Egg yolks add a rich, yellow color to baked products. Eggs also add color to crusts during the browning process.

## LEAVENING AGENTS

A **leavening agent** is a substance that causes a baked good to rise by introducing carbon dioxide (CO<sub>2</sub>) or other gases into the mixture. The gases expand from the heat of the oven, stretching the cell walls in the baked product. The end result is a light, tender texture and good volume. The main leavening agents are air, steam, baking soda, baking powder, and yeast.

### Air

Air is an important leavening agent in all baked products since air is added during the mixing process. Angel food cake is a good example of a baked product that relies on air as a leavening agent. You can add air to a mixture by whipping egg whites. See Fig. 27-16.

### Steam

Steam is another important leavening agent. It is created during the baking process when water evaporates to steam and expands. Because water in one form or another is in all baked products, steam is an important leavening gas. It is especially important to items such as puff pastries and croissants.

### Baking Soda

Baking soda, or sodium bicarbonate (SO-dee-um by-CAR-buh-nate), is a chemical leavening agent that must be used with acid to give off CO<sub>2</sub> gas. There are many sources of acid used in bak-



When whisking light mixtures, hold the whisk like a pencil, with the balloon end pointing away from you.



When whisking heavier mixtures, it is less tiring if you hold the whisk with the balloon end facing you, slightly bending the wrist.

**Fig. 27-16.** Air is incorporated into a mixture through physical means. How does air affect the item's texture and volume?

ing, such as buttermilk, sour cream, and yogurt; fruits and fruit juices; most syrups, including honey and molasses; and chocolate. The  $\text{CO}_2$  gas is what causes the baked products to rise. Mix baking soda thoroughly, or it will leave an unpleasant aftertaste.

## Baking Powder

Baking powder is made up of baking soda, an acid such as cream of tartar, and a moisture-absorber such as corn starch. When mixed with a liquid, baking powder releases  $\text{CO}_2$ . The type used in the bakeshop is double-acting. This means that when it first comes in contact with moisture, it gives off  $\text{CO}_2$ . When it comes into contact with heat, it gives off more  $\text{CO}_2$ . Double-acting baking powder can be fast- or slow-acting. Fast-acting varieties react more quickly when mixed with liquids. The slow-acting varieties require more heat to release  $\text{CO}_2$ . Baking powder is used as a leavening agent in cakes, cookies, muffins, and quick breads.

**Fig. 27-17.** Commercial bakeshops use different types of yeast to cause baked goods to rise. Describe how to activate the following types of yeast: compressed, dry active, quick-rise dry.

## Yeast

Yeast is a living organism. During a process called **fermentation** (FUR-mun-TAY-shun), yeast breaks down sugars into carbon dioxide gas and alcohol, which are necessary for the rising process in products such as bread. Yeast products get their distinctive aroma and flavor from this process. The types of yeast most commonly used in bakeshops are compressed yeast, dry active yeast, and quick-rise dry yeast. See Fig. 27-17.





■ **Compressed yeast.** Sometimes called fresh or wet compressed yeast, this type of yeast is moist and must be refrigerated. Compressed yeast is available in 0.6-oz. cubes or 2-lb. blocks. It should be creamy white, have a crumbly texture, and smell like freshly baked bread. To use compressed fresh yeast, crumble it into warm water. Don't use compressed yeast that looks brown, feels slimy, or smells sour. Compressed yeast rapidly deteriorates at room temperature.

■ **Dry active yeast.** Dry yeast has had most of its moisture removed by hot air, which leaves granules of dormant yeast that are "asleep." Dry yeast must be reactivated in liquid that is between 100°F and 110°F before being added to other ingredients. Dry active yeast is available in ¼-oz. packets, 4-oz. jars, or 1- to 2-lb. vacuum-sealed

bags. Unopened packages can be stored in a cool, dry place for several months. Once opened, containers of dry active yeast should be kept frozen. When substituting active dry yeast for compressed yeast, use 50% less than called for in the formula.

■ **Quick-rise dry yeast.** Also called instant yeast, quick-rise dry yeast is similar in appearance to dry active yeast. However, its leavening action is much quicker, speeding the rising of dough. Quick-rise dry yeast provides closer results to compressed yeast. To use quick-rise dry yeast, blend it with the dry ingredients. Then add water that is between 100°F and 110°F to activate the yeast. Quick-rise dry yeast lasts at least one year in unopened packages or when stored frozen.

Fig. 27-18.

SPICES	USES IN THE BAKESHOP
Allspice	Used in cakes and puddings; allspice is the dried, unripe berry of a tropical tree; available whole or ground; combines flavors of cinnamon, nutmeg, and cloves.
Anise	Used in cakes, cookies, and candies; anise is the dried seed of a plant; available whole or ground; licoricelike flavor.
Cardamom	Used in pastries and baked goods; cardamom is the seed of a native Indian herb; available whole or ground; sweet, peppery flavor.
Cinnamon	Used in cakes, cookies, pies, breads, and desserts; cinnamon is the thin, dried inner bark of an evergreen tree; available ground or in sticks; warm, spicy flavor.
Cloves	Used in baked goods such as breads and pies; cloves are the dried flower buds of an evergreen tree; available whole or ground; warm, spicy flavor.
Ginger	Used in baked goods such as cookies and cakes; ginger is the root of a tropical plant; available dried or fresh; sweet, peppery flavor.
Nutmeg	Used in custards, pies, breads, and other baked goods; nutmeg is the kernel or seed of the fruit of an evergreen tree; available whole or ground; sweet, warm, spicy flavor.
Poppy Seed	Used in breads, rolls, and other baked goods; poppy seed is the dried, ripened seed of a Middle-Eastern plant; nutty flavor.

## Salt

Salt also has an important role in baking. It enhances the product through its own flavor as well as bringing out the flavor of other ingredients. Salt also acts on gluten and results in an acceptable texture. A certain amount of salt is also necessary to slow down or control fermentation in yeast products. However, salt can negatively react in baked goods if it is not measured accurately or if it is added at the wrong point in the mixing process.

## FLAVORINGS

Flavorings include extracts and spices. Although flavorings don't usually influence the baking process, they do enhance the flavor of the final baked product.

■ **Extracts.** Extracts are liquid flavorings that contain alcohol. They are mostly concentrated, volatile oils or essences diluted with alcohol. Vanilla extract is the exception. It is made by passing alcohol through the vanilla bean, with little or no heat, to extract flavor.

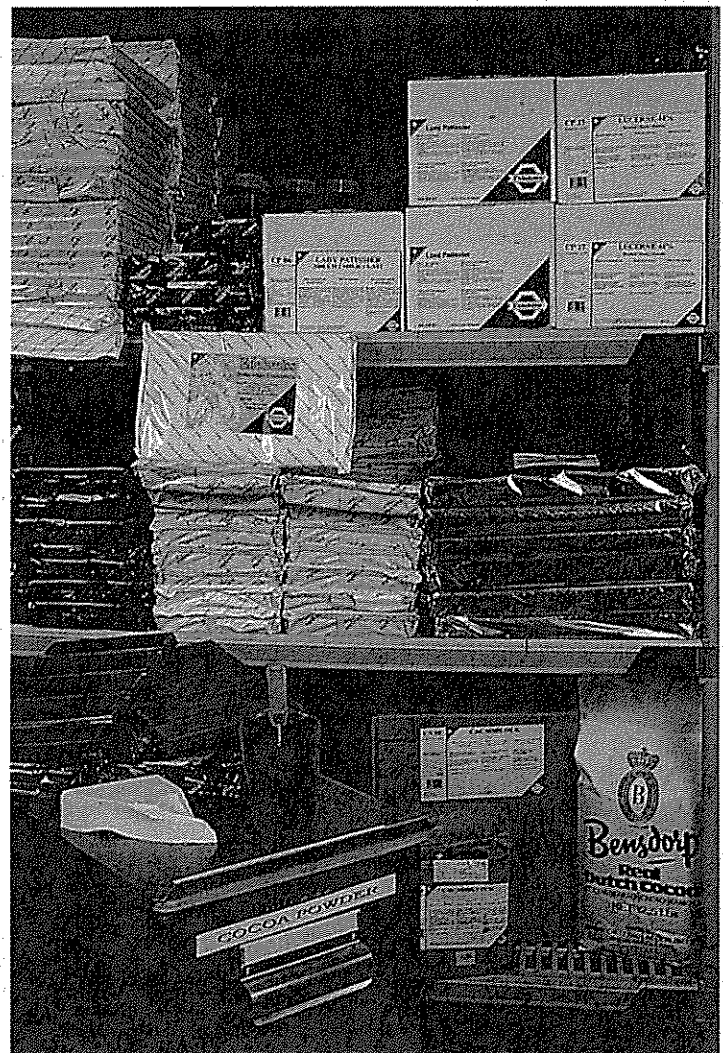
■ **Spices.** Spices add to the enhancement of food and baked goods by adding flavor, color, or aroma. Most spices come from the bark, roots, flower buds, berries, or seeds of aromatic plants or trees. While not commonly thought of as spices, coffee beans and vanilla pods also fall into this category. Citrus zest, or the outer skin of oranges, lemons, and limes, is considered a spice, too.

Ground spices release their flavor quickly and are often purchased in quantities that can be used within three months. The flavor of whole spices comes out over long cooking periods such as those used in baking. Spices should be used carefully so they don't overpower the food. The spices used frequently in the bakeshop are listed in Fig. 27-18. For more information on spices, see Chapter 16.

## CHOCOLATE & COCOA

Chocolate and cocoa add body, bulk, and a unique color and flavor to a wide variety of baked products. Both items are made from the cacao (cuh-CAY-oh) bean. The "meat" of the cacao bean is roasted and ground into a thick substance called chocolate liquor. Cocoa butter is a by-product of cocoa powder production. More steps are then taken to create a variety of chocolate or cocoa products. The most common varieties in the bakeshop are unsweetened chocolate, semi-sweet chocolate, liquid chocolate, cocoa powder, and Dutch-process cocoa powder. See Fig. 27-19.

**Fig. 27-19.** All varieties of chocolate and cocoa come from the cacao bean. What is the difference between cocoa powder and Dutch-process cocoa powder?



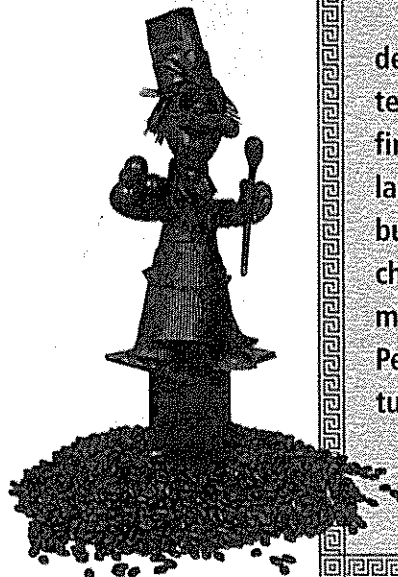
■ **Unsweetened chocolate.** This form of chocolate is also known as bitter or baking chocolate. It is the pure, hardened substance that results from roasted and ground cacao beans. Unsweetened chocolate has no added sugar or milk solids. It is bitter because it contains no sugar. Unsweetened chocolate gives baked products an especially rich taste because it still contains all of the cocoa butter from the bean.

■ **Semisweet chocolate.** Sugar, lecithin (LEH-suh-thun), and vanilla are added to create semi-sweet or bittersweet chocolate. Semisweet chocolate is often used in chocolate chip cookies and glazes.

■ **White chocolate.** White chocolate is made from cocoa butter, sugar, vanilla, lecithin, and dried or condensed milk. There is no chocolate liquor in white chocolate.

■ **Cocoa powder.** This is the dry, brown powder that remains once the cocoa butter is removed from the chocolate liquor. It is used mostly in baking and has no added sweeteners or flavorings. Cocoa powder absorbs moisture and provides structure, as does flour.

■ **Dutch-process cocoa powder.** This type of cocoa has a darker color and milder flavor than regular cocoa. It is less likely to lump and produces a milder, smoother chocolate flavor. Dutch-process cocoa can be substituted for unsweetened chocolate when adjustments are made to the amount of cocoa and shortening used.



## a LINK to the Past

### CHOCOLATE



Whether it appears in cookies, candy, or drinks, chocolate is one of the world's favorite foods. It probably comes as no surprise to you that America leads the world in chocolate consumption.

Chocolate and cocoa come from the fruit of the cacao tree. For many years cocoa was used to make hot chocolate—but only by those who could afford it. As domestic cultivation of the cacao tree grew, prices fell and hot chocolate was enjoyed throughout Europe.

In 1828 the Dutch created a cocoa powder that had a milder taste and mixed better with water. The English produced the first edible chocolate by combining chocolate with sugar, then remixing it with cocoa butter to create a solid product. Swiss chemist Henri Nestlé invented powdered milk in 1867. Swiss chocolate maker Daniel Peter used this powdered milk to manufacture milk chocolate—giving us candy bars as we know them today.

Fig. 27-20.

ADDITIVE	FOOD ITEMS	PURPOSE
Thiamin Niacin Riboflavin Iron	<ul style="list-style-type: none"> <li>• Flours, breads</li> </ul>	<ul style="list-style-type: none"> <li>• Nutrients</li> </ul>
Beta carotene Red No. 3 Green No. 3 Yellow No. 6	<ul style="list-style-type: none"> <li>• Margarine</li> <li>• Candies</li> <li>• Various baked products</li> </ul>	<ul style="list-style-type: none"> <li>• Coloring agents</li> </ul>
Lecithin	<ul style="list-style-type: none"> <li>• Chocolate, baked products, margarine</li> </ul>	<ul style="list-style-type: none"> <li>• Emulsifier</li> </ul>
Carrageenan Pectin Modified starches	<ul style="list-style-type: none"> <li>• Ice cream, cream cheese, sherbets, fruit fillings, puddings, pie fillings</li> </ul>	<ul style="list-style-type: none"> <li>• Thickeners and stabilizers</li> </ul>
Glycerine	<ul style="list-style-type: none"> <li>• Cake icings</li> </ul>	<ul style="list-style-type: none"> <li>• Humectant (used to retain moisture and keep foods soft)</li> </ul>
Chlorine Potassium bromate Benzoyl peroxide Ascorbic acid	<ul style="list-style-type: none"> <li>• Cake flour</li> <li>• Bread flour</li> <li>• All flour</li> <li>• Bread flour</li> </ul>	<ul style="list-style-type: none"> <li>• Bleaching and maturing agents</li> </ul>
Sodium bicarbonate Potassium carbonate	<ul style="list-style-type: none"> <li>• Baking powder</li> <li>• Dutch-processed cocoa powder</li> </ul>	<ul style="list-style-type: none"> <li>• Acids, alkalis, and buffers (used to adjust and control acidity or alkalinity)</li> </ul>
Gum and starch derivatives	<ul style="list-style-type: none"> <li>• Frozen desserts</li> </ul>	<ul style="list-style-type: none"> <li>• Fat replacers</li> </ul>
Polydextrose	<ul style="list-style-type: none"> <li>• Baked products, puddings</li> </ul>	<ul style="list-style-type: none"> <li>• Bulking agent (used to provide texture and body in reduced-fat goods)</li> </ul>

## ADDITIVES

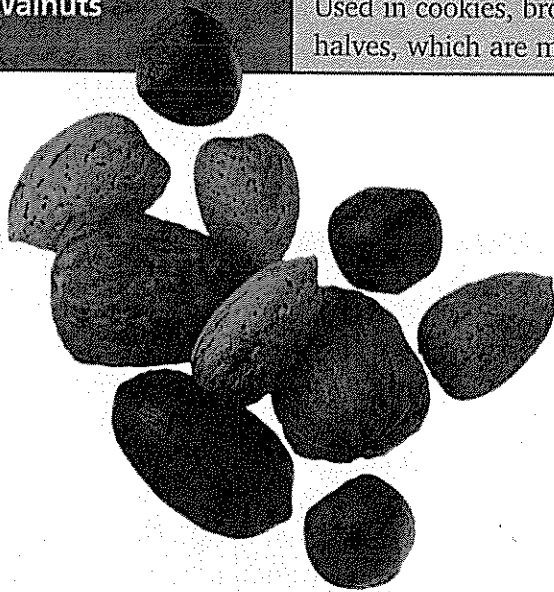
Additives are used in the bakeshop to color, thicken, provide texture in, and replace fat in baked products. See Fig. 27-20 for a list of common additives used in the bakeshop.

## NUTS

Nuts are often used to provide flavor, texture, and color in baked products. Fig. 27-21 shows the nuts most commonly used in commercial bakeshops. For more information on nuts, see Chapter 16.

Fig. 27-21.

NUTS	USES IN BAKING
<b>Almonds</b>	Used in breads, cakes, pastries, marzipan, and as decorations; sweet almonds are eaten, bitter almonds are used as a source of flavorings and extracts; available whole, slivered, ground, sliced, and in flour or meal form.
<b>Chestnuts</b>	Used to flavor buttercreams and fillings, and as a decoration for cakes and cookies; sweet flavor; available dried, chopped, and canned as a paste.
<b>Coconuts</b>	Used in cakes, cookies, pies, and desserts; available grated or flaked and may be sweetened or unsweetened; desiccated (de-si-KATE-ed) coconut is dried, unsweetened coconut that has been ground to a fine meal.
<b>Hazelnuts</b>	Also known as filberts; used in candies, baked goods, and desserts; can be made into a paste for flavoring buttercreams and fillings; available whole in the shell, whole shelled, or chopped.
<b>Macadamia Nuts</b>	Used in cakes, cookies, and ice creams; smooth, buttery flavor; available roasted and salted; very expensive.
<b>Peanuts</b>	Used in pastries and candies, such as peanut brittle; often combined with chocolate creations; available raw, dry roasted, in granules.
<b>Pecans</b>	Used in pies, breads, and desserts; mild and sweet flavor; available shelled in halves or pieces; expensive, but other nuts can easily be substituted.
<b>Pine Nuts</b>	Used in breads, cookies, and pastry; available raw or toasted; resemble almonds in flavor.
<b>Pistachios</b>	Used in cakes, pastries, and to flavor buttercreams and ice creams; mild flavor and fine texture; available shelled, roasted, and salted.
<b>Walnuts</b>	Used in cookies, brownies, cakes, muffins, and ice creams; available in halves, which are mostly used for decoration, and pieces.



## MIXING BATTERS & DOUGHS

Batters and doughs are formed when the dry and liquid ingredients are combined to create baked products. **Batters** contain almost equal parts of dry and liquid ingredients. Batters are usually easy to pour. Cakes and muffins are examples of baked products made from batters.

**Doughs** contain less liquid than batters, making it easy to work doughs with your hands. Doughs may even be stiff enough to be cut into

shapes. Many types of breads are made from dough. There are a variety of ways to mix batters and doughs. Nine ways are described here.

1. **Beating.** Agitating (A-juh-TATE-ing) ingredients vigorously to add air or develop gluten is called beating. You may use a spoon or a bench mixer with a paddle attachment for beating.
2. **Blending.** Mixing or folding two or more ingredients together until they're evenly combined is called blending. Use a spoon, whisk, rubber spatula, or bench mixer with a paddle attachment for blending.
3. **Creaming.** Vigorously combining softened fat and sugar to add air is called creaming. Use a bench mixer on medium speed with a paddle attachment for creaming.
4. **Cut in.** To cut in, mix solid fat with dry ingredients until lumps of the desired size remain. Use a pastry cutter or a bench mixer with a paddle attachment to cut in fat.
5. **Folding.** Gently adding light, airy ingredients such as eggs to heavier ingredients by using a smooth circular movement is called folding.
6. **Kneading.** Working a dough by hand or in a bench mixer with a dough hook to develop gluten and evenly distribute ingredients is called kneading.

7. **Sifting.** Passing dry ingredients such as flour through a wire mesh to remove lumps, blend, and add air is called sifting. Use a rotary sifter or a mesh strainer for sifting.
8. **Stirring.** Gently blending ingredients until they're combined is called stirring. Use a spoon, rubber spatula, or whisk for stirring.
9. **Whipping.** Vigorously beating ingredients to add air is called whipping. Use a whisk or a bench mixer with a whip attachment for whipping.

## CULINARY TIP

**CARRYOVER BAKING**—Baked products continue to bake for a short time after being removed from a hot oven. This process is called **carryover baking**. The chemical and physical changes that occur during the baking process do not stop immediately. The product continues to bake because of the heat contained in the product. If you don't take carryover baking into account, you will end up with overbaked products.

### SECTION 27-2 Knowledge Check

1. Why is gluten so important in the baking process?
2. Describe what leavening agents do for baked products.
3. Contrast batters and doughs.

#### MINI LAB

Choose a bakeshop ingredient to research. Use print and Internet resources to create a poster that explains where the ingredient comes from and how it is used to create baked products.