As you will learn in this chapter, different flours, shortenings, and other ingredients do not function alike. Bakers' formulas are balanced for specific ingredients. Do not substitute bread flour for pastry flour or regular shortening for emulsified shortening, for example. They won't work the same way.

Occasionally, a substitution may be made, such as active dry yeast for compressed yeast (see p. 904), but not without adjusting the quantities or rebalancing the formula.

MIXING AND GLUTEN DEVELOPMENT

WHAT IS GLUTEN?

Gluten is a substance made up of proteins present in wheat flour; it gives structure and strength to baked goods.

In order for gluten to be developed, the proteins must first absorb water. Then, as the dough or batter is mixed or kneaded, the gluten forms long, elastic strands. As the dough or batter is leavened, these strands capture the gases in tiny pockets or cells, and we say the product rises. When the product is baked, the gluten, like all proteins (see p. 65), coagulates or solidifies and gives structure to the product.

HOW DOES THE BAKER CONTROL GLUTEN?

Flour is mostly starch, but its protein or gluten content, not its starch, concerns the baker most. Without gluten proteins to give structure, baked goods would not hold together.

The baker must be able to control the gluten, however. For example, we want French bread to be firm and chewy, which requires much gluten. On the other hand, we want cakes to be tender, which means we want very little gluten development.

Ingredient proportions and mixing methods are determined, in part, by how they affect the development of gluten. The baker has several methods for adjusting gluten development.

1. **Selection of flours.**
   Wheat flours are classified as *strong* or *weak*, depending on their protein content.

   Strong flours come from *hard wheat* and have a high protein content.

   Weak flours come from *soft wheat* and have a low protein content.

   Thus, we use strong flours for breads and weak flours for cakes.

   Only wheat flour develops gluten. To make bread from rye and other grains, the formula must be balanced with some high-gluten wheat flour, or the bread will be heavy.

2. **Shortening.**
   Any fat used in baking is called a **shortening** because it shortens gluten strands. It does this by surrounding the particles and lubricating them so they do not stick together. Thus, *fats are tenderizers.* A cookie or pastry that is very crumbly, due to high fat content, is said to be "short."

   You can see why French bread has little or no fat, while cakes contain a great deal.

3. **Liquid.**
   Because gluten proteins must absorb water before they can be developed, the amount of water in a formula can affect toughness or tenderness. Pie crusts and crisp cookies are made with very little liquid to keep them tender.

4. **Mixing methods.**
In general, the more a dough or batter is mixed, the more the gluten develops. Thus, bread doughs are mixed or kneaded for a long time to develop the gluten. Cakes, pie crusts, muffins, and other products that must be tender are mixed for a short time.

It is possible to overmix bread dough, however. Gluten strands stretch only so far. They break if the dough is overmixed.

THE BAKING PROCESS

The changes undergone by a dough or batter as it bakes are basically the same for all baked products, from breads to cookies and cakes. You should know what these changes are so you can learn how to control them.

The stages in the baking process take place as follows.

1. **Formation and expansion of gases.**
Some gases are already present in the dough, as in proofed bread dough and in sponge cake batters. As they are heated, the gases expand and leaven the product.

Some gases are not formed until heat is applied. Yeast and baking powder form gases rapidly when first placed in the oven. Steam is also formed as the moisture of the dough is heated.

Leavening and leavening agents are discussed in more detail beginning on page 903.

2. **Trapping of the gases in air cells.**
As the gases form and expand, they are trapped in a stretchable network formed by the proteins in the dough. These proteins are primarily gluten and, sometimes, egg protein.

Without gluten or egg protein, the gases would escape, and the product would not be leavened. Breads without enough gluten are heavy.

3. **Coagulation of proteins.**
Like all proteins, gluten and egg proteins coagulate or solidify when they reach high enough temperatures. This is the process that gives structure to baked goods.

Correct baking temperature is important. If the temperature is too high, coagulation will start too soon, before the expansion of gases has reached its peak. The product will have poor volume or a split crust. If the temperature is too low, the proteins will not coagulate soon enough, and the product may collapse.

4. **Gelatinization of starches.**
The starches absorb moisture, expand, and become firmer.

5. **Evaporation of some of the water.**
This takes place throughout the baking process.

6. **Melting of shortenings.**
Different shortenings melt—and release trapped gases—at different temperatures, so the proper shortening should be selected for each product.

As the fats melt, they surround the air cells and make the product more tender.

7. **Crust formation and browning.**
Browning occurs when sugars caramelize and starches and proteins undergo certain changes. This contributes to flavor. Milk, sugar, and egg increase browning.

A crust is formed as water evaporates from the surface and leaves it dry.

STALING

Staling is the change in texture and aroma of baked goods due to the change in structure and the loss of moisture by the starch granules. Stale baked goods have lost their fresh-baked aroma and are firmer, drier, and more crumbly than fresh products.

Prevention of staling is a major concern of the baker because most baked goods lose quality rapidly.

Staling can be slowed by these techniques.

1. **Protecting the product from air.**
   Wrapping bread in plastic and covering cakes with icing are two examples.

   Unfortunately, hard-crusted breads, which stale rapidly, should not be wrapped, or the crusts will become soft. These bread products should always be served fresh.

2. **Adding moisture retainers to the formula.**
   Fats and sugars are good moisture retainers, and products high in these ingredients keep best.

   Some of the best French bread has no fat at all, and if it is not served within hours of baking, it will begin to stale. For longer keeping, bakers often add a very small amount of fat and/or sugar to the formula.

3. **Freezing.**
   Baked goods frozen *before* they become stale maintain quality for longer periods. They should be served very soon after thawing. Frozen breads may be reheated with excellent results if they are to be served immediately.

   Refrigerating actually seems to speed staling rather than slowing it. Only baked goods that could develop health hazards, such as those with cream fillings, are refrigerated.

Loss of crispness is caused by absorption of moisture, so it is, in a sense, the opposite of staling. This is a problem with low-moisture products such as cookies and pie crusts. The problem is usually solved by proper storage in airtight wraps or containers to protect the products from moisture in the air. Prebaked pie shells should be filled as close to service time as possible.

INGREDIENTS

The following introduction to baking ingredients is necessarily simplified. If you decide to pursue a career as a baker, you will need to learn a great deal of technical information. However, the basic information presented here is enough to enable you to produce a full range of baked items in a small bakeshop or restaurant kitchen.

FLOURS, MEALS, AND STARCHES

WHITE WHEAT FLOUR

White wheat flour is milled from wheat kernels after the outer covering, called bran, and the germ are removed. Wheat flour contains about 63 to 73 percent starch and 7 to 15 percent protein. The rest is moisture, fat, sugar, and minerals.

Wheat flour is the source of the protein called *gluten*, which you remember is one of the essential elements in baking. Bakers select flour on the basis of its gluten content. Flours high in protein are called *strong*, and those low in protein are called *weak*. (Note: Rye, barley, oats, and some other grains also contain gluten proteins, but these proteins do not develop into a gluten structure as do the proteins in wheat flour. Thus, for the baker, these other grains in effect do not contain gluten, but people with gluten intolerance may still have to avoid them in their diets.)

For our purposes, in the small bakeshop, we need to know about three kinds of wheat flour.

1. **Bread flour** is a strong flour used for making breads, hard rolls, and any product that requires high gluten. The best bread flours are called *patents*. *Straight* flours are also strong flours.
2. **Cake flour** is a weak or low-gluten flour made from soft wheat. It has a soft, smooth texture and a pure white color. Cake flour is used for cakes and other delicate baked goods that require low gluten content.
3. **Pastry flour** is lower in gluten than bread flour but higher than cake flour. It has the same creamy white color as bread flour, not the pure white of cake flour. Pastry flour is used for cookies, pie pastry, some sweet yeast doughs, biscuits, and muffins.

Being able to identify these three flours by sight and touch is an important skill because, sooner or later, someone will dump a bag of flour into the wrong bin, and you will need to recognize the problem.

Bread flour feels slightly coarse when rubbed between the fingers. If squeezed into a lump, it falls apart as soon as the hand is opened. Its color is creamy white.

Cake flour feels smooth and fine. It stays in a lump when squeezed in the palm of the hand. Its color is pure white.

Pastry flour feels like cake flour but has the creamy color of bread flour.

All-purpose flour, seen in retail markets, is not often found in bakeshops. This flour is formulated to be slightly weaker than bread flour so it can be used for pastries as well. A professional baker, however, prefers to use flours that are formulated for specific purposes because these give the best results.

WHOLE WHEAT FLOUR

Whole wheat flour is made by grinding the entire wheat kernel, including the bran and germ. The germ, which is the embryo of a new wheat plant, is high in fat, which can become rancid. This is why whole wheat flour does not keep as well as white flour.

Because it is made from wheat, whole wheat flour contains gluten, so it can be used alone in bread making. However, a bread made with 100 percent whole wheat will be heavy because the gluten strands are cut by the sharp edges of the bran flakes. Also, the fat from the wheat germ contributes slightly to the shortening action. This is why most whole wheat breads are strengthened with white bread flour.

Bran flour is flour to which bran flakes have been added. The bran may be coarse or fine, depending on specifications.

RYE FLOUR

Next to white and whole wheat, rye is the most popular flour in bread making. Because rye flour does not develop much gluten, breads made with it are heavy unless some hard wheat flour is added.

Rye flour is available in three shades, *light*, *medium*, and *dark*. *Rye meal* or **pumpernickel** is a coarse meal made from the whole rye grain. It looks something like oatmeal.

Rye blend is a mixture of rye flour and hard wheat flour.

OTHER FLOURS

Products milled from other grains are occasionally used to add variety to baked goods. These include cornmeal, buckwheat flour, soy flour, potato flour, oat flour, and barley flour. The term *meal* is used for products that are not as finely ground as flour.

All these products must normally be used in combination with wheat flour because they do not form gluten.

STARCHES

In addition to flours, other starch products are also used in the bakeshop. Unlike flour, they are used primarily to thicken puddings, pie fillings, and similar products. The principles of thickening with starches are covered in Chapter 8.

The most important starches in dessert production are as follows.

1. *Cornstarch* has a special property that makes it valuable for certain purposes. Products thickened with cornstarch set up almost like gelatin when cooled. For this reason, it is used to thicken cream pies and other products that must hold their shape.
2. *Waxy maize* and other *modified starches* also have valuable properties. They do not break down when frozen, so are used for products that are to be frozen. Also, they are clear when cooked, and give a brilliant, clear appearance to fruit pie fillings.

   Waxy maize does not set up firm like cornstarch but makes a soft paste, which has the same consistency hot and cold. Thus, it is not suitable for cream pie fillings.
3. *Instant starches* are precooked or pregelatinized, so they thicken cold liquids without further cooking. They are useful when heat will damage the flavor of the product, as in fresh fruit glazes (such as strawberry).

FATS

We have said that one of the main functions of fats in baking is to shorten gluten strands and tenderize the product. We can summarize the reasons for using fats in baked items as follows:

- To tenderize the product and soften the texture.
- To add moistness and richness.
- To increase keeping quality.
- To add flavor.
- To assist in leavening when used as creaming agents or when used to give flakiness to puff pastry, pie dough, and similar products.

SHORTENINGS

Any fat acts as a shortening in baking because it shortens gluten strands and tenderizes the product. However, we usually use the word *shortening* to mean any of a group of solid fats, usually white and tasteless, that are specially formulated for baking.

Because shortenings are used for many purposes, manufacturers have formulated different kinds of fats with different properties. Following are the three main types of shortening.

Regular Shortenings

These shortenings have a tough, waxy texture, and small particles of the fat tend to hold their shape in a dough or batter. This type of shortening does not melt until a high temperature is reached.

Regular shortening has good creaming ability. This means that a large quantity of air can be mixed into it to give a batter lightness and leavening power. Therefore, it is used in products mixed by the creaming method, such as certain cookies.

Because of its texture, this type of shortening is used for flaky products such as pie crusts and biscuits. It is also used in breads and many pastries. Unless another shortening is specified, regular shortening is generally used.

Emulsified Shortenings

These are soft shortenings that spread easily throughout a batter and quickly coat the particles of sugar and flour. Because of their easy spreading, they give a smoother and finer texture to cakes and make them moister.

Emulsified shortening is often used whenever the weight of sugar in a cake batter is greater than the weight of flour. Because this shortening spreads so well, a simpler mixing method can be used, as explained in Chapter 32. Such cakes are referred to as *high-ratio* cakes, so emulsified shortening is sometimes called *high-ratio shortening*.

In addition, emulsified shortening is used in certain icings because it can hold more sugar and liquid without curdling.

Puff Pastry Shortenings

Puff pastry shortenings are firm like regular shortening. They are especially formulated for puff pastry and other doughs that form layers, such as Danish pastry.

BUTTER AND MARGARINE

Shortenings are manufactured to have certain textures and hardness. Butter, on the other hand, is a natural product that doesn't have these advantages. It is hard and brittle when cold and soft at room temperature, and it melts easily. Consequently, doughs made with butter are hard to handle. Margarine is a little easier to handle, but it has many of the same disadvantages.

On the other hand, butter and margarine have two major advantages.

1. **Flavor.**
   Shortenings are intentionally flavorless, but butter has a highly desirable flavor.
2. **Melting qualities.**
   Butter melts in the mouth. Shortenings do not. After eating pastries or icings made with shortening, one can be left with an unpleasant film of shortening coating the mouth.

For these reasons, many bakers and pastry chefs feel that the advantages of butter outweigh its disadvantages for some purposes.

OILS

Oils are liquid fats. They are not often used as shortening in baking because they spread through a batter or dough too thoroughly and shorten too much. Their usefulness in the bakeshop is limited primarily to greasing pans and proofing bowls, to deep-frying doughnuts, and to serving as a wash for some kinds of rolls. A few quick breads and cakes use oil as a shortening.

LARD

Lard is the rendered fat of hogs. Because of its plastic quality, it was once highly valued for making flaky pie crusts. Since the development of modern shortenings, it is not often used in the bakeshop.

SUGARS

Sugars or sweetening agents are used for the following purposes in baking:

- To add sweetness and flavor.
- To create tenderness and fineness of texture by weakening the gluten structure.
- To give crust color.
- To increase keeping qualities by retaining moisture.
- To act as creaming agents with fats.

We customarily use the term *sugar* for regular refined sugars derived from sugar cane or beets. The chemical name for these sugars is **sucrose**. However, other sugars

different chemical structure are also used in the bakeshop. The following are the ore important sugars.

EGULAR REFINED SUGARS, OR SUCROSE

fined sugars are classified by the size of grains.

Granulated sugar.

Regular granulated, also called *fine granulated* or *table* sugar, is the most familiar and the most commonly used.

Very fine and *ultrafine* sugars are finer than regular granulated. They are prized for making cakes and cookies because they make a more uniform batter and can support higher quantities of fat.

Sanding sugars are coarser and are used for coating doughnuts, cakes, and other products.

Confectioners' or powdered sugars.

Confectioners' sugars are ground to a fine powder and mixed with a small amount of starch to prevent caking. They are classified by coarseness or fineness.

10X is the finest sugar. It gives the smoothest textures in icings.

6X is the standard confectioners' sugar. It is used in icings, toppings, and cream fillings.

Coarser types (*4X* and *XX*) are used for dusting or for any purposes for which 6X and 10X are too fine.

MOLASSES AND BROWN SUGAR

olasses is concentrated sugar cane juice. *Sulfured molasses* is a byproduct of sugar fining. It is the product that remains after most of the sugar has been extracted from ne juice. *Unsulfured molasses* is not a byproduct but a specially manufactured sugar oduct. Its taste is less bitter than that of sulfured molasses.

Molasses contains large amounts of sucrose, plus other sugars, acids, and impurities.

Brown sugar is mostly sucrose, but it also contains varying amounts of molasses id other impurities. The darker grades contain more molasses.

Because molasses and brown sugar contain *acids*, they can be used with baking da to provide leavening (see p. 904).

Molasses retains moisture in baked goods and so prolongs freshness. However, isp cookies made with molasses quickly become soft for the same reason.

ORN SYRUP

rn syrup is a liquid sweetener consisting mainly of a sugar called *glucose*. It is made converting cornstarch into simpler sugar compounds by the use of enzymes.

Corn syrup aids in retaining moisture and is used in some icings and in candy aking.

LUCOSE SYRUP

hile corn syrup contains other sugars in addition to glucose, pure glucose syrup is so available. It resembles corn syrup but is colorless and nearly tasteless. If a recipe lls for glucose syrup and none is available, substitute light corn syrup.

ONEY

oney is a natural sugar syrup consisting largely of glucose and fructose, plus other ompounds that give it flavor. Honeys vary considerably in flavor and color, depending their source. Flavor is the major reason for using honey, especially because it can be xpensive.

Honey contains invert sugar, which means that it stays smooth and resists crystallizing. Like molasses, it contains *acid*, which enables it to be used with baking soda as a leavening.

MALT SYRUP

Malt syrup is used primarily in yeast breads. It serves as food for the yeast and adds flavor and crust color to the breads.

LIQUIDS

Gluten cannot be developed without moisture, so liquids are essential to the baking process.

Pie crusts provide a good illustration of how liquids function in baking. If too much water is incorporated in a pie dough, a lot of gluten develops and the crust is tough. If no water at all is used, no gluten develops and the crust does not hold together.

Some of the moisture in doughs and batters changes to steam during baking. This contributes to leavening.

WATER

Water is the basic liquid in baking, especially in breads.

Tap water is normally suitable for most baking purposes. However, in some localities, the water may be *hard*, meaning that it contains many dissolved minerals. These minerals interfere with proper gluten development. In these areas, the water may have to be treated for use in baking.

MILK AND CREAM

Milk products, as described in Chapter 25, are important in baking. These products include liquid whole and skim milk, buttermilk, and dry milk solids.

Milk contributes to the texture, flavor, nutritional value, keeping quality, and crust color of baked goods.

1. Whole milk contains fat, which must be calculated as part of the shortening in a dough. For this reason, whole and skim milk are not interchangeable in a formula unless adjustments are made for the fat.
2. Buttermilk, which is slightly acid, is often used in conjunction with baking soda as a leavening agent in quick breads.
3. Cream is not often used as a liquid in doughs and batters, except in a few specialty products. In these instances, it is used as a shortening as well as a liquid because of its fat content.

   Cream is more important in the production of fillings and toppings.
4. Dry milk is often used because of its convenience and low cost. In some formulas, it is not necessary to reconstitute it. The milk powder is included with the dry ingredients, and water is used as the liquid.

OTHER SOURCES OF LIQUIDS

Eggs, honey, molasses, and even butter (about 15 percent water) contribute moisture to a dough or batter. In many cookies, for example, eggs are the only liquid in the formula.

EGGS

FORMS

As we discussed in Chapter 24, eggs are purchased in the following forms:

1. Whole shell eggs.
2. Frozen: whites, yolks, whole, and whole with extra yolks.
3. Dried: whole, whites, yolks.

FUNCTIONS

Eggs perform the following functions in baking.

1. **Structure.**
   Like gluten protein, egg protein coagulates to give structure to baked products. This is especially important in high-ratio cakes, where the high sugar and fat content weakens the gluten.
   If used in large quantities, eggs make baked products tough or chewy unless balanced by high fat and sugar, which are tenderizers.
2. **Emulsification of fats.**
   Egg yolks contain natural emulsifiers, which help produce smooth batters. This contributes to volume and to texture.
3. **Leavening.**
   Beaten eggs incorporate air in tiny cells or bubbles. In a batter, this trapped air expands when heated and aids in leavening.
4. **Shortening action.**
   The fat in egg yolks acts as a shortening. This is an important function in products that are low in other fats.
5. **Moisture.**
   Whole eggs are about 70 percent water, egg whites about 86 percent water, and egg yolks about 49 percent water. This moisture must be calculated as part of the total liquid in a formula.
6. **Flavor.**
7. **Nutritional value.**
8. **Color.**
   Yolks impart a yellow color to doughs and batters. Also, eggs brown easily and contribute to crust color.

LEAVENING AGENTS

Leavening is the production or incorporation of gases in a baked product to increase volume and to produce shape and texture. These gases must be retained in the product until the structure is set enough (by the coagulation of gluten and egg protein) to hold its shape.

Exact measurement of leavening agents is important because small changes can produce major defects in baked products.

YEAST

Fermentation is the process by which yeast acts on carbohydrates and changes them into carbon dioxide gas and alcohol. This release of gas produces the leavening action in yeast products. The alcohol evaporates completely during and immediately after baking.

Yeast is a microscopic plant. As a living organism, it is sensitive to temperatures.

34°F (1°C)	Inactive; storage temperature.
60° to 70°F (15° to 20°C)	Slow action.
70° to 90°F (20° to 32°C)	Best growth; proofing temperature for bread doughs.
Above 100°F (38°C)	Reaction slows.
140°F (60°C)	Yeast is killed.

Yeast is available in three forms:

1. **Fresh yeast**, also called *compressed yeast*, is moist and perishable and is preferred by professional bakers. It is usually purchased in 1-lb (450-g) cakes.
2. **Active dry yeast** is a dry, granular form of yeast. Active dry yeast must be rehydrated in 4 times its weight of warm water [about 110°F (43°C)] before use. When using active dry yeast in a bread formula, use part of the water in the formula to dissolve the yeast. Do not add additional water.
3. **Instant dry yeast** is also a dry granular form of yeast, but it does not have to be dissolved in water before use. It can be added in its dry form because it absorbs water much more quickly than regular dry yeast. It also produces more gas than regular dry yeast, so less of it is needed. Instant dry yeast is sometimes called *rapid-rise* or *quick-rise yeast*.

In this book, when yeast is required in a formula, fresh yeast is specified. To substitute dry yeast, use the following guidelines.

To convert fresh yeast to regular active dry yeast, multiply the quantity by 0.5. For example, if the formula calls for 1½ ounces fresh yeast, multiply by 0.5 to get ¾ ounce active dry yeast.

To convert fresh yeast to instant dry yeast, multiply the quantity by 0.35. For example, if the formula calls for 40 g fresh yeast, multiply by 0.35 to get 14 g instant yeast.

Yeast contributes flavor in addition to leavening action.

CHEMICAL LEAVENERS

Chemical leaveners are those that release gases produced by chemical reactions.

Baking Soda

Baking soda is the chemical sodium bicarbonate. If *moisture* and an *acid* are present, soda releases carbon dioxide gas, which leavens the product.

Heat is not necessary for the reaction (although the gas is released faster at higher temperatures). For this reason, products leavened with soda must be baked at once, or the gases will escape and leavening power will be lost.

Acids that react with soda in a batter include honey, molasses, buttermilk, fruits, cocoa, and chocolate. Sometimes cream of tartar is used for the acid. The amount of soda used in a formula is generally the amount needed to balance the acid. If more leavening power is needed, baking powder, not more soda, is used.

Baking Powder

Baking powders are mixtures of baking soda plus an acid to react with it.

Because baking powders do not depend on acid ingredients for their leavening power in a formula, they are more versatile.

Single-acting baking powders require only moisture to be able to release gas. Like baking soda, they can be used only if the product is to be baked immediately after mixing.

Double-acting baking powders release some gas when cold, but they require heat for complete reaction. Thus, cake batters made with these can incorporate the leavening agent early in the mixing period and can stand for some time before being baked.

Do not include more baking powder than necessary in a formula because undesirable flavors may be created.

Baking Ammonia

Baking ammonia is the chemical ammonium carbonate. It decomposes during baking to form carbon dioxide gas and ammonia gas. Only heat and moisture are necessary for it to work. No acids are needed.

Because it decomposes completely, it leaves no residue that can affect flavor. However, it can be used only in small products, like cookies, which allow the ammonia gas to be completely driven off.

Baking ammonia releases gases quickly, so it is sometimes used in products like cream puffs where rapid leavening is desired.

AIR

Air is incorporated into a batter primarily by two methods, creaming and foaming. This air expands during baking and leavens the product.

1. **Creaming** is the process of beating fat and sugar together to incorporate air. It is an important technique in cake and cookie making. Some pound cakes and cookies are leavened almost entirely by this method.
2. **Foaming** is the process of beating eggs, with or without sugar, to incorporate air. Foams made with whole eggs are used to leaven sponge cakes, while angel food cakes, meringues, and soufflés are leavened with egg white foams.

STEAM

When water turns to steam, it expands to 1,600 times its original volume. Because all baked products contain some moisture, steam is an important leavening agent.

Puff pastry, cream puffs, popovers, and pie crusts use steam as their major or only leavening agent.

If the starting baking temperature for these products is high, steam is produced rapidly and leavening is greatest.

SALT, FLAVORINGS, AND SPICES

SALT

Salt plays an important role in baking. It is more than just a seasoning or flavor enhancer. It also has these functions:

1. Salt strengthens gluten structure and makes it more stretchable. Thus, it improves the texture of breads.
2. Salt inhibits yeast growth. It is, therefore, important for controlling fermentation in bread doughs and in preventing the growth of undesirable wild yeasts.

For these reasons, the quantity of salt in a formula must be carefully controlled.

CHOCOLATE AND COCOA

Chocolate and cocoa are derived from cocoa or cacao beans. When the beans are roasted and ground, the resulting product is called *chocolate liquor*, which contains a white or yellowish fat called *cocoa butter*.

Cocoa is the dry powder that remains after part of the cocoa butter is removed from chocolate liquor.

Dutch process cocoa is processed with an alkali. It is slightly darker, smoother in flavor, and more easily dissolved in liquids than regular cocoa.

Bitter or *unsweetened chocolate* is straight chocolate liquor. In some less expensive brands, some of the cocoa butter may be replaced by another fat.

Sweet chocolate is bitter chocolate with the addition of sugar in varying amounts. If the percentage of sugar is low, it is sometimes called *semisweet* or *bittersweet*.

Milk chocolate is sweet chocolate with the addition of milk solids. It is used primarily in candy making. (None of the recipes in this book call for milk chocolate.)

Cocoa and chocolate are high in starch. When cocoa is added to a cake formula, it is sometimes considered part of the flour proportion for this reason.

SPICES

Spices are discussed in detail in Chapter 4. The most important spices in the bakeshop are cinnamon, nutmeg, mace, cloves, ginger, caraway, cardamom, allspice, anise, and poppy seed.

Because spices are used in small quantities, it is not much more expensive to use the best quality, and the results are superior.

Spices should be measured by weight unless the quantity is so small that measuring spoons are necessary.

EXTRACTS AND EMULSIONS

Extracts are flavorful oils and other substances dissolved in alcohol. These include vanilla, lemon, and bitter almond.

Emulsions are flavorful oils mixed with water with the aid of emulsifiers such as vegetable gums. Lemon and orange are the most frequently used emulsions.

The flavorings of extracts and emulsions may be natural or artificial. Natural flavorings give the best results, but they are often expensive. Artificial flavorings must be used in moderation to avoid creating strong or undesirable flavors in baked items.