Seven Basic Ingredients

FLOUR, sugar, eggs, milk, butter, baking soda, flavorings — with this simple list of ingredients a seemingly endless variety of sweet goods, from breads to sauces to pastries, can be made. However, to produce consistently good brioche, Bavarians, biscuits, or the like, careful attention must be paid to the character and quantity of each ingredient. Accurate measurements are critical in the bakeshop. It is equally important to follow bakeshop formulas carefully and completely. Unlike other types of cooking, baking mistakes often cannot be discovered until the product is finished, by which time it is too late to correct them. For example, if salt is left out when preparing a stew, the mistake can be corrected by adding salt at service time. If salt is left out of a batch of bread dough, the mistake cannot be corrected after the bread has baked, and its texture and flavor may be ruined. It is more important to follow a written formula, measure ingredients precisely, and combine them accurately in the bakeshop than anywhere else in the kitchen.

Objective:

Summarize the seven basic ingredients and their variations.

Key Terms:

baking powder
baking soda
bread flour
brown sugar
cake flour
confectioner's sugar
corn syrup
crumb
extracts
gluten
honey
leavening agent
maple syrup
margarine
molasses
oil
pastry flour
shortening
spices
staling
turbinado sugar
vegetable shortening

Basic Ingredients

From a simple list of ingredients such as flour, liquids, fat, sugar and sweeteners, eggs, leavening agents, and flavorings, you can make and endless variety of baked goods.

FLOUR

- **Wheat flour** is the most common type of flour used in baking.
- **Bread flour** is used to make yeast breads, pizza and bagels and has a high protein content.
- **Cake flour** has a lower protein content than bread flour and pastry flour. Cake flour is used to produce nice, delicate cakes.
- **Pastry flour** has a protein content that is between that of bread flour and cake flour and is used to make pie dough, cookies, muffins and quick breads. It can be used to make cakes only if cake flour is unavailable.

FIGURE 1. Many different types of flours are used in the bakeshop and each plays an important role in certain products. Each type of flour has its own protein content which produces different internal textures for different products.

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.
- Accurate measurement of liquids is important because too much or too little can affect the outcome of the baked product.

- Water: water is the most common liquid ingredient used in baking, especially for breads.
- 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.
- Dried milk solids: 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 nonfat dry milk with other dry ingredients or mix it with shortening, before you add the water separately.
- Dairy products such as buttermilk, heavy cream, yogurt and sour cream are also used in the bakeshop as liquids. Cream is used as a liquid in custards, sauces, and ice creams.

FAT

- In baking, solid fats are referred to as **shortening**. The most common types of fat used in the bakeshop include all-purpose shortening, emulsified shortening, oil, butter and margarine.
- Vegetable shortening: when most people hear the word shortening, they think of a solid, white, flavorless fat used for baking. **Vegetable shortening**, is made from purified oils that have been hydrogenated to make them solid and less likely to become rotten. 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 shortening contains emulsifiers and these 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. High-ratio shortenings look like creamy oils and some cake formulas are designed to use these liquid shortenings. Other fats cannot replace high-ratio liquid shortenings because of their unique characteristics.
- Oil: an **oil** is a fat that is extracted from plants such as soybeans, corn, peanuts, and cottonseed. Oil is liquid at room temperature and neutral in flavor and color because they are highly refined.
- Butter: butter can be purchased with or without salt and unsalted butter is used in baking because of its pleasant flavor.
- Margarine: **margarine** is typically a hydrogenated vegetable oil that has color, flavor, and water added. Margarines have improved over the years and while they cannot match butter's superior flavor, they are less likely to spoil and are usually lower in saturated fat. Margarines, like butter, can be purchased either salted or unsalted.

SUGAR AND 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 crystalized or turned into crystals, and separated

FIGURE 2. There are a wide variety of sugars and sweeteners used in the bakeshop. Sugar and sweeteners add more than just a pleasant flavor, they aide in browning, provide food for yeast, are main ingredients in making icings and much more.

from the dark, thick, molasses that forms. It must be refined to produce sugar grains of different sizes. Various sugars and sweeteners are used in the bakeshop.

- **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** is a soft-textured mixture of white sugar and molasses. It can be light or dark in color. Store brown sugar in air-tight containers to prevent moisture absorption.
- **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.
- Coarse sugar, also known as sanding sugar, consists of large, coarse crystals that do not dissolve easily. It is used to decorate items such as doughnuts or cakes.
- Granulated sugar is regular table sugar and often referred to as extra fine white sugar. It is the most common sugar used in the bakeshop and can be used in cooked icings, candies, and other baked products.
- **Confectioner's sugar**, also known as powdered sugar, is granulated sugar that has been crushed into a fine powder. Confectioner's 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 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.
- **Corn syrup** is produced from the starch in corn. The starch granules are removed from corn kernels and treated with acids or enzymes to create a thick, sweet syrup.
- **Maple syrup** 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** is a thick, sweet liquid made by bees from flower nectar. The type of flower affects the final flavor and color of the honey. Honey is widely used in baked products and should be stored in a cool, dry place

EGGS

- Eggs are the second most important ingredient in baked products.
- Eggs come in a variety of sizes and formulas listing the amount of eggs by number instead of weight have based the formula on large eggs, which weigh about 2 ounces each.
- Bakeshops use egg yolks instead of whole eggs when they want a richer, more tender product. They also use egg white in place of whole eggs when they bake low-fat products.
- Shell eggs and egg products, such as liquid frozen eggs, dried eggs and liquid refrigerated eggs are used in baking.

LEAVENING AGENTS

A **leavening agent** is a substance that causes a baked product to rise by introducing carbon dioxide or other gases into the mixture. The main leavening agents are air, steam, baking soda, baking powder and yeast.

- Air is an important leavening agent in all baked products, since air is adding during the mixing process. Angel food cake is a good example of a baked product that relies on air as a leavening agent. [For example: You can add air to a mixture by whipping egg whites.]
- Steam is another important leavening agent and is created during the baking process when water evaporates to steam and expands. Since 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** or sodium bicarbonate, is a chemical leavening agent that must be used with acid to give off carbon dioxide gas. There are many sources of acid used in baking, such as buttermilk, sour cream, yogurt; fruits and fruit juices; most syrups, including honey and molasses; and chocolate. [NOTE: mix baking soda thoroughly or it will leave an unpleasant flavor.]
- **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 carbon dioxide. The type used in the bakeshop is double-acting, meaning that when it first comes in contact with moisture it gives off carbon dioxide and then when it comes in contact with heat, it gives off more. Baking powder is used in cakes, cookies, muffins and quick breads.
- **Yeast** is a living organism. The types of yeast most commonly used in bakeshops are compressed yeast, dry active yeast and quick-rise dry yeast.

FLAVORINGS

- **Extracts** are liquid flavorings that contain alcohol.
- **Spices** come from the bark, roots, flower buds, berries, or seeds of aromatic plants or trees. Ground spices release 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 that they do not overpower the food. Some common spices used frequently in baking include: allspice, anise, cinnamon, cloves, ginger and nutmeg.

FIGURE 3. Extracts and spices are common flavorings in baked products. Extracts are liquid flavorings and spices come from aromatic plants or trees and are available in either whole or ground form.

USE EXACT INGREDIENTS

Baking, unlike cooking, leaves little margin for error. You cannot just substitute the same amount of cake flour for bread flour and expect to come up with the same end results. 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.

Functions of Ingredients

Ingredients are more than just parts of a baking formula, they add flavor, texture, and visual appeal to all types of baked products.

FLOUR

- The proteins and starch in flour give products structure.
- **Gluten** is 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. Gluten is the substance that makes bread dough strong and elastic, without gluten you could not stretch the dough and hold in the gases that make it rise. The dough would collapse, resulting in poor volume and a coarse crumb. The **crumb** is the internal texture of a baked product.

BROADENING AWARENESS...

AMAZING ASPECTS: Gluten Sensitivity

Gluten is a protein found in wheat and other grains. When kneaded or worked, gluten protein develops into long strands that stretch and hold a structure. This is why kneaded bread can rise without the bubbles of carbon dioxide bursting through the dough. If yeast dough is not kneaded, the carbon dioxide production from yeast is a bit to vigorous for the dough to resist it. It will be flat. Gluten is responsible for the pleasantly chewy elastic quality of yeast breads.

Some individuals have an intestinal sensitivity to gluten. A disorder called "Gluten Sensitive Enteropathy" (GSE), also called "Celiac Disease", is caused by gluten, which approximately 1 to 2 percent of the population suffers from. The interior lining of the small intestine becomes inflamed in the presence of gluten. Pain and diarrhea result. These individuals can avoid gluten in the diet and improve their symptoms.

LIQUIDS

- Liquids such as water, milk and cream have many uses in baking besides moistening dry ingredients.
- Water is necessary for gluten structure to form in flour. Since water is tasteless, odorless, and colorless, it does not affect the flavor or color of baked products and it also adds zero fat or calories.
- Milk can provide some improvements such as: creating a soft crust on items such as cream puffs or eclairs; adding more color or flavor to crusts when it is applied to the surfaces 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.

FIGURE 4. Staling is the process by which moisture is lost in a product, causing a change in the texture and aroma of food. Staling causes the crumb to be dry.

FATS

- During the baking process, fats surround, or enclose, the flour particles and prevent long strands of gluten from forming. This will tenderize the baked product.

- Fats also add to the flavor, moistness, browning, flakiness, and leavening, depending on the type of fat used.

SUGARS AND SWEETENERS

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

- Creating a golden-brown color
- Stabilizing mixtures such as beaten egg whites for meringue.
- 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.

EGGS

Eggs serve the following functions during baking:

- Structure — because of the protein content, eggs give structure to baked products such as cakes. They also help thicken some products such as custard sauces.
- Emulsification — egg yolks have natural emulsifiers that help blend ingredients smoothly.
- Aeration — 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 products.
- Color — egg yolks add a rich, yellow color to baked products and crusts.

FIGURE 5. Leavening agents cause baked products to rise by giving off gas they release during the baking process. During baking, the gas causes the cell walls in the baked product to stretch.

LEAVENING AGENTS

Leavening agents cause a baked product to rise by the gases they

release during the baking process causing the cell walls in the baked product to stretch. The end result is a light, tender texture and good volume.

SALT AND FLAVORINGS

- Salt has an important role in baking, Salt 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.
- Although flavorings do not usually influence the baking process, they do enhance the flavor of the final baked product. Spices for example add to the flavor, color or aroma to baked products.

Summary:

Everyone loves a good dessert. A perfectly moist, rich slice of chocolate cake or a warm piece of pie with a light, flaky crust are the perfect ending to a meal. No small amount of time, effort and precision go into creating such delicious desserts. It all starts with knowing the basics. How is milk used in baked goods? Is an egg a strengthener, a liquid, a leavening agent, or all three? How many types of flour are there? While many people may know the general ingredients that go into baked goods, not many know exactly how they are used or in what proportions.

Checking Your Knowledge:

1. Differentiate between the various types of flour.
2. Which ingredient is the most important ingredient in a baked good? Which is second?
3. Describe what a leavening agent does for a baked product.
4. Describe what gluten is and what it does for baked products.
5. Differentiate between milk and water as liquids ingredients.

Expanding Your Knowledge:

You probably think of baking as a means to an end. The means is mixing sugar, flour and eggs into a bowl, and the end is cookies, a cake, or something else sweet. In truth, baking is much more complex than that. It's essentially chemistry, and there is a lot more going on behind the scenes. The real reason you need the exact amounts of the various ingredients in what you are baking is because you are mak-

ing a small, controlled chemical reaction. The wrong amounts mean that it wont work at all.

Web Links:

Intro to Understanding Baking Ingredients
https://www.youtube.com/watch?v=TuvImdGdXxE

Baking School Fundamentals Playlist
https://www.youtube.com/watch?v=62MOCMyPce0&list=PL1dleLLvCiHOrrj21DtCDiU8oXySckf8

Ingredients in Baking: Functions Playlist
https://www.youtube.com/watch?v=OoCqGDn1Daw&list=PLXwTJ3B8e0VE5cnU2qaiQly3HXQCFNnL0

Baking Series: How to Measure Ingredients Correctly
https://www.youtube.com/watch?v=VzVUH8Pocw8

The Physics of Baking
https://www.youtube.com/watch?v=dXCrTJLk_kY