



Basic Ingredients in Baking



- Flour
- Sugar
- Fats
- Liquids
- Eggs
- Salt
- Yeast



Flour



Purpose:

- the principle **structure builder or binding agent**.
 - a toughening agent because when it comes in contact with liquids, the flour protein form **gluten**.
- Varieties of flours used include
 - Bread flour
 - Pastry flour
 - Cake flour

Flour



Looking closely, we can see that flour is made up mostly of **starch granules** and **proteins**.
(Whole grain flour will also contain bits of the rest of the grain.)



Proteins

These are what make the future dough **sticky** and **elastic**.



When **flour** and **water** are mixed together...

Flour



the tightly coiled proteins **Glutenin** and **Gliadin** loosen up and link together to form a *Gluten Network*.



This elastic gluten network **stretches** as gases expand within the rising dough.

Flour



More Protein

Longer Mixing

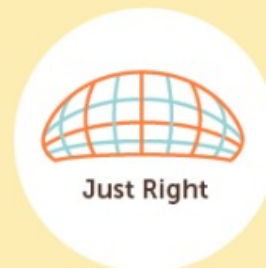
Stronger
Gluten Network



Too Strong
Won't rise.



Too Weak
Won't stay risen.



Just Right

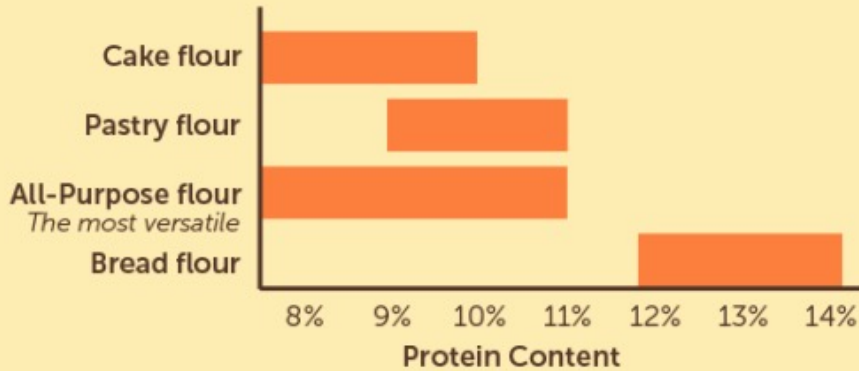
Flour



Which flour should you use?

Different types of flour have different amounts of **protein**.

High protein flours are better for **strong breads and biscuits** while **low protein** flours work best for **crumbly pastries or cakes**.



Flour



Starch

This is the **carbohydrate** portion of the flour.

A Starch Granule

Will likely either

Be broken down into **simple sugars** by enzymes,

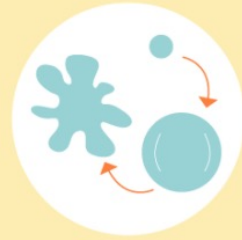


and fed upon by **yeast**
(if available)



See "Leavening"
below

Gelatinize, whereby the starch, given enough **water** and **heat**, will swell, burst and solidify.



When lots of starch granules gelatinize, they become the **structure** of the baked good.



Fats



Fat has five major roles in baking.

- How well it will perform each of these functions depends largely on the "slip point"
 - the temperature at which the fat just begins to melt. In general the slip point should be at least 5 °C above the proving temperature of the dough.
- 1. Shortening
 - Fat weakens or 'shortens' a dough by weakening its gluten network, resulting in the baked product being softer, breaking easily and having a more tender mouthfeel.
- 2. Creaming
 - trap air during beating and mixing, producing a batter that consists of masses of tiny air bubbles trapped within droplets of fat.
 - very important in cake baking in which it is these air bubbles that expand during baking forming a light, airy structure.

Fats



3. Layering

- In puff pastry, fats which are soft over a wide temperature range are used.
- These can be spread between pastry layers and will separate them during cooking giving a layered pastry.

4. Flavor

- Usually the fats used should have a bland flavor to prevent them from changing the flavor of the finished product,
- occasionally fats are chosen on the basis of their flavor - e.g. using butter for particular baked goods and lard for meat pie pastry.

5. Emulsion

- the fat chosen needs to be able to form an emulsion with the other ingredients in the batter or dough.

Fats



- Types:
 - Regular **hydrogenated shortening** having a bland flavor is preferred and commonly used.
 - Butter and margarine produce baked goods with a more desirable taste and flavor.
 - Eggs add both **tenderizers and toughness** in baked goods

Fat

Fatty ingredients, such as butter, vegetable shortening and oils, are used to “shorten” the formation of gluten.



Fat coats the flour and, being **hydrophobic**, repels the water that would otherwise activate its **proteins**...



slowing gluten formation and leaving you with a **softer and more tender** final product.



Sugar



Purpose:

- Undissolved sugar crystals melt during baking which contributes to the flow or spread of baked goods.
- Types of Sugar
 - Granulated sugar
 - Powdered sugar
 - Brown sugar
 - Molasses
 - Honey

SUGAR

rapadura/jaggery/panela/piloncillo



Is made from the juice of sugarcane, which is then evaporated over a low heat and is non-centrifuged, meaning it contains all the molasses and mineral content.

muscovado



A 'natural brown sugar' which is made from the juice of the sugarcane by evaporation until crystallisation occurs. It is then centrifuged to separate the crystals and the molasses are drained via gravity. It does still contain some mineral content however not as high as Rapadura.

raw/demerara/cane sugar



Is crystallised, partially evaporated cane sugar which is spun in a centrifuge to remove most of the molasses. Is usually a large grain and a pale amber colour.

brown sugar



Commercial brown sugar is produced by the addition of molasses to refined white sugar. The difference between light and dark brown sugar is the percentage of molasses added.

refined/white/caster/superfine



Is made from raw sugar which has undergone further refinement to remove the molasses through centrifugation and by using phosphoric acid, a carbonation process involving calcium hydroxide and carbon dioxide, it is then further purified through a bed of activated carbon.

powdered/icing/confectioners sugar



Is made by milling refined sugar into a powder. This type of sugar usually will contain an anti-caking agent as well to prevent clumping.

Sugar



- **Granulated sugar**
 - Most commonly used
 - The finer the granulation, the more the product will spread.
- **Powdered sugar**
 - Powdered sugar is used when a fine, grained compact interior with little spread is desired
- **Brown sugar**
 - used to obtain a certain flavor.
 - When brown sugar is used in place of granulated sugar, a small amount of baking soda should be used to neutralize the acid in brown sugar.
 - acids interfere with caramelization of sugar.

Sugar



- **Molasses**
 - is a viscous by-product of refining sugarcane or sugar beets into sugar
 - is used to obtain particular flavor.
 - Formulas containing molasses have to be adjusted by the addition of **baking soda** to compensate for the **acidity**.
 - An adjustment must be made in the amount of liquid as well.
- **Honey**
 - Honey is also used to obtain a particular flavor.
 - Honey adds a **chewy quality**.



Sugar



Caramelization

This is what's responsible for the **toasty, nutty aromas** and **caramel flavor** of a finished baked good.



At around **350°**, sugars begin to break down and release those familiar tastes and smells.

Sugar



Maillard Reaction

This reaction is similar to caramelization in that it's also responsible for **browning**.

However, it occurs when sugars **bind with amino acids**, not when sugars break down.



There are many different combinations of sugar and amino acids that can be made, and they all create a **unique taste** and **aroma**.

Liquids



Purpose:

- Water is necessary to moisten the flour proteins to form **gluten** so the structure can be formed.

• Types:

- Water (most commonly used)
- Milk (used to add additional nutritional value, but sometimes negatively effects taste of the cookies)

Leavening Agents



Purpose:

- Leavening ingredients help to control **spread or size**, produces volume and promote proper crust color through regulation of **acidity or alkalinity (pH)** of the dough.

• Types:

– Baking soda

- sodium bicarbonate
- lowers the carmelization point of sugar in the baked good, causing faster and darker coloring of the crust.

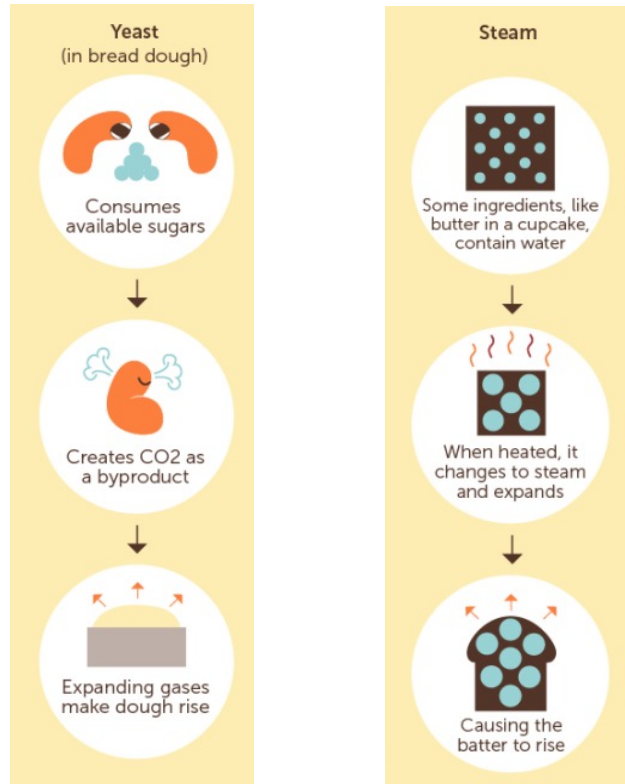
– Cream of Tartar

- produces a whiter crumb color and a lighter crust color.

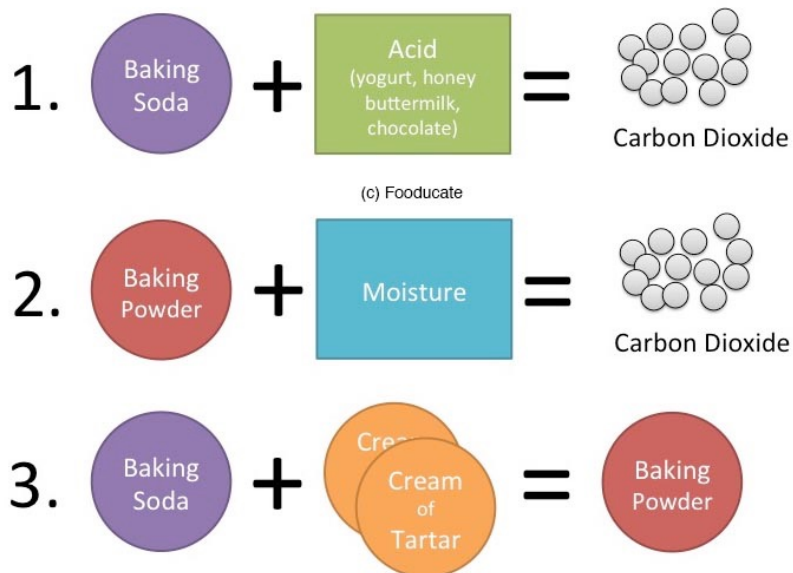
– Baking powder

- mix of both baking soda and cream of tartar.

Leavening



Baking Soda vs Baking Powder

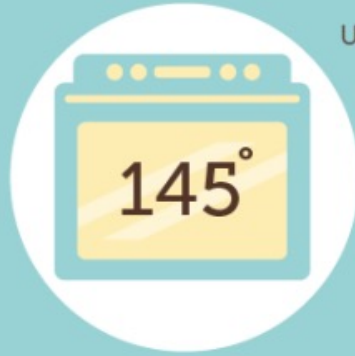


Eggs

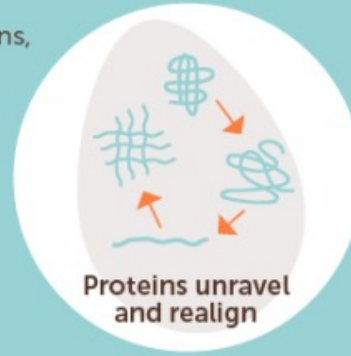


Solidify

Kind of like flour proteins, egg proteins also unravel and realign to make a **solid** out of a **liquid**, giving **structure** to the baked good.



Unlike flour proteins, this process requires **heat**, not water.



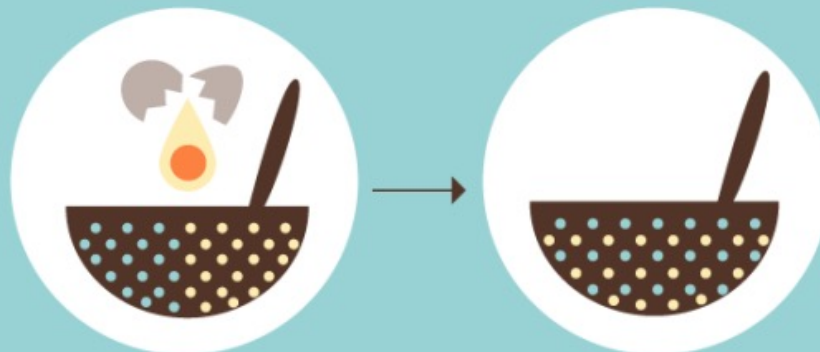
Eggs



Emulsify

Many recipes require **fats** and **water-based liquids** to come together in a solution, even though they repel each other. This kind of solution is called an **emulsion**.

Egg yolks contain **lecithin**, which is an **emulsifier**, meaning it can make fats and water-based liquids **mingle**.

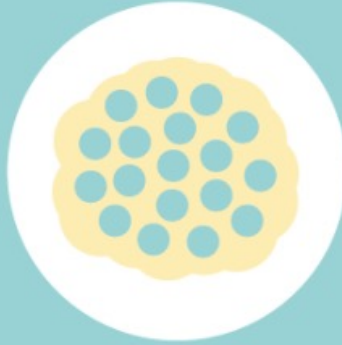


Eggs



Leaven

Whipping up egg whites will make them partially solidify, allowing them to fill with air bubbles.



If folded into the dough **carefully**, the air bubbles will stay intact and give your dough some extra lift.

Flavoring Agents



Purpose: To add flavor

- Types:

- Salt

- used for its own flavor and to bring out the natural flavors of the other ingredients.

- Cocoa

- requires an adjustment to the formula.
- Sugar is added to counteract the tendency of the cocoa to toughen the dough and to sweeten and enhance the cocoa flavor.

- Other

- Oatmeal, peanuts, spices, chocolate chips and nuts can be used to produce particular flavors and textures.

Salt



Like sugar, salt does more than just round out the flavor.

Helps Control Yeast



Since **yeast needs water** to perform its functions, this hinders it, and **slows the leavening**.

Salt



Helps Strengthen Dough

Dough without salt tends to be a sticky glob.



The how and why of this is debated, but some think it has to do with **ionic charge**.

