FAQ

1. Mention the baking mixing process in the production of dough and batters?

Ans: The baking mixing process in the production of dough and batters are

1. Blending the ingredients.
2. Forming the dough.
3. Developing the dough.

2. Explain the importance of hydration in the baked goods.

Ans: Hydration is the process of absorbing water. Many ingredients in baked goods absorb or react with water in different ways. All these processes are necessary for dough formation. Starch is, by weight and volume, the largest component of bread doughs and most other doughs and batters. It does not dissolve in water, but it does attract and with water molecules and undergoes a change in form. Water molecules become attached to the surface of starch granules, forming a kind of shell around them. During baking, the heat causes the hydrated starch to gelatinize. Without hydration during mixing, gelatinization cannot not take place.

Proteins, too, are mostly insoluble in water, but they also attract and bind with water molecules during mixing. Gluten proteins in dry flour form tight coils. Once they come into contact with water they begin to uncoil. Mixing then causes the straightened proteins to stick together and form long gluten fibers. This is essential for the formation of gluten. Yeast requires water in order to become active and begin fermenting sugars and releasing carbon dioxide gas for leavening. Salt, sugar and chemical leaveners such as baking powder have no effect on baked items in their dry form. They must be dissolved in water in order to carry out their many functions.

3. Explain gluten formation in the baked goods?

Ans Glutenin and gliadin are two proteins found in wheat flour and, in much smaller quantities, in a few other grains, such as rye and spelt. During mixing, these two proteins combine with water (that is, they are hydrated) and form a stretchable substance called gluten. As explained above, gluten forms when hydrated glutenin proteins uncoil and attach to each other to form long chains. During mixing, these protein chains gradually stretch and become intertwined, forming an elastic network we call the gluten structure.

Coagulation is the firming or hardening of gluten proteins, usually caused by heat. When gluten proteins coagulate during baking, they solidify into a firm structure. Soft, pliable bread dough is converted into firm bread crumb that holds its shape. During coagulation proteins release much of the water they absorbed during mixing. Some of this water evaporates, and some is absorbed by the starch.

4. Explain the hardness of water in the gluten development?

Ans: Water hardness refers to the mineral content of the water, especially its calcium content. Water with a high mineral content is called hard. The minerals in hard water strengthen gluten, making the dough too elastic and hard to work. Too soft water makes the dough too slack and sticky. Treated water or dough conditioners can be used to counteract these effects. The strongest gluten development takes place with a slightly acid pH of 5 to 6.The tenderness of a baked item can be adjusted by adding either an acid, such as fruit juice, to lower the pH beyond the 5 to 6 range or adding an alkali, such as baking soda, to raise the pH above this range.

5. What are the steps in the baking process?

Ans: The steps in the baking process are;

1. The mixing action blends the water with the flour so the flour proteins can hydrate. This is the first step in the development of gluten.
2. Air is mixed into the dough. The oxygen in the air reacts with the gluten and helps strengthen it and make it more elastic.
3. The mixing action develops the gluten by stretching and aligning the gluten strands into an elastic network.

6. Explain the function of gases in the baked foods?

Ans: The gases primarily responsible for leavening baked goods are carbon dioxide, which is released by the action of yeast and by baking powder and baking soda. Air, which is incorporated into doughs and batters during mixing; and steam, which is formed during baking. 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. As the product rises, the cell walls become thinner as they are stretched by the expanding gases. This tenderizes the product.

Production and expansion of gases starts immediately at the beginning of baking. Yeast diet at 60°C and stops producing carbon dioxide. However, production of steam continues throughout the baking process. As the gases are formed 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.

7. What are the chances of survival of microorganisms in baking?

Ans: In addition to yeast, doughs may contain other organisms, including bacteria and molds. Most of these, including yeast, die when the interior temperature of the item reaches about 60°C, although some microorganisms may survive to a slightly higher temperature. When yeast dies, fermentation stops and no more carbon dioxide gas is released.

8. Which are the protein responsible for the structure of baked goods?

Ans: Gluten and egg proteins are the proteins primarily responsible for the structure of most baked goods. They provide this structure only when they are heated enough to coagulate, or become firm. This process begins slowly at 60° to 70°C.

During this process, gases continues to expand and the protein strands stretch. Finally, when coagulation is complete, the air cells can no longer expand and the product stop rising. Much of the water that bonded with the protein during mixing is released and either evaporates or is absorbed by starch. Once the protein structure has completely coagulated, the baked item is able to hold its shape.

The exact temperatures at which coagulation begins and is completed depends on several factors, including the other ingredients that are

present. Sugars and fats, especially, affect the coagulation temperature of protein. Most proteins, however, are completely coagulated by the time they reach 85°C.

9. Write the importance of correct baking temperature.

Ans: The temperatures at which coagulation begins and gets completed depends on several factors like presence of other ingredients.Sugars and fats, especially, affect the coagulation temperature of protein. Most proteins, however, are completely coagulated by the time they reach 85°C.

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

10. What is the process of gelatinization in the baked goods?

Ans: Starch molecules make up the majority of most baked goods. Thus, starch is an important part of the structure. Although starches by themselves generally can't support the shape of the baked item, they give bulk to the structure.

Starches make a softer structure when baked than proteins do. The softness of the crumb of baked bread is due largely to the starch. The more protein structure there is, the chewier the bread is. During baking, the water is absorbed into the granules, which swell greatly in size. Some of the starch granules break open and release starch molecules. During this process, starch molecules bind with any available water. This is why the interior of baked doughs are fairly dry, while unbaked doughs are moist. Most (but not all) of the water is still present but has bonded with starch.

This process, called gelatinization, begins when the interior reaches about 40°C and continues throughout baking, or until about 95°C.

11. Explain the baking process and the water vapor in baked foods?

Ans: Throughout the baking process, some of the water turns to steam

and escapes into the air. If this takes place before the proteins coagulate, it contributes to leavening. In addition to steam, carbon dioxide and other gases escape as well. In yeast products, alcohol produced by the fermentation process is one of these gases.

Another result of the loss of moisture is the beginning of crust formation. As moisture is lost from the surface it becomes harder. The crust begins to form even before browning starts. Baking breads with steam injected into the oven slows crust formation by delaying the drying of the surface. Delaying crust formation allows the bread to continue rising.

A measurable amount of moisture is lost during baking. If a baked product of a specific weight is required, allowance must be made for moisture loss when scaling the dough. For example, to get a 500g loaf of baked, it is necessary to have about 510g dough. The percentage of weight loss varies greatly, depending on factors such as proportion of surface area to volume, baking time, and whether the item is baked in a pan or directly on the oven heath.

12. What is formation of crust and browning in baked foods means?

Ans: A crust is formed as water evaporates from the surface and leaves it dry. Browning cannot occur until the surface temperature rises to about 150°C and this happens only when surface dries. Browning begins before the interior of the item is completely baked and continues for the rest of the baking period.

Browning occurs when chemical changes occur to starches, sugars, and proteins. This is referred to as caramalization. Caramalization involves the browning of sugars. This along with Maillard reaction (proteins), causes most of the crust browning of baked goods. This a process that occurs when proteins and sugars together are subjected to high heat. Maillard browning also occurs on the surface of meats and other high-protein foods.

The chemical changes caused by caramalization and Maillard browning contribute to the flavor and appearance of the baked item. Milk, sugar, and egg, when included in doughs and batters, increase browning.

13. What is impact of cooling on baked goods?

Ans: Moisture continues to escape after the baked item is removed from the oven. At the same time, cooling begins, which causes the gases inside the item to contract. If the protein structure is completely set, the product may shrink slightly but hold its shape. If the product is underbaked, however, the contraction of gases may cause it to collapse.

When baked goods are removed from the oven, the surface is dried than the interior crumb. During cooling, the moisture content tries to equalize throughout the item. As a result, crisp crusts gradually become softer. Proteins continue to solidify and bind to one another during cooling. Many products are fragile when they are still hot, but cooling makes them firm enough to handle. It is best to handle or cut most baked goods when they have cooled. Fats that melted during baking resolidifies. This process also helps make the texture firmer.

Starches continue to gelatinize while the interior is still hot. Also, starch molecules bind with each other and become more solid as the product cools. This process is called starch retrogradation and is responsible for staling.

14. Explain the condition responsible for staling of baked foods?

Ans: Staling is the change in texture and aroma of baked goods due to a change of structure and a loss of moisture by the starch granules. Stable baked goods lose 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.

Starch retrogradation begins as soon as the product begins to cool. As starch molecules bond with each other, the starch forces out moisture and becomes harder and drier. Even though moisture may be absorbed by other ingredients such as sugar, the resultant product texture will be drier.

Starch retrogradation is more rapid at refrigerator temperatures than at room temperature, but it nearly stops at freezer temperatures. Thus, bread should not be stored in the refrigerator. It should be left at room temperature for short-term storage or frozen for long-term storag. Chemical staling, can be partially reversed by heating. Breads, muffins, and coffee cakes, for example, are frequently refreshed by placing them briefly in an oven. However, this also results in more loss of moisture to the air, so the items should be reheated only just before they are to be served.

15. What are the classification of baked products?

Ans: Based on the types of mixing the product can be categorized as follows:

a) Hard dough: crackers, semisweet products

b) Short dough: Pastry products, short sweet product

c) Batter: Wafers, crisp bread, cakes