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Pastry and Bakery



TOPIC 2:

BASIC BAKING PRINCIPLES



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LEARNING OUTCOMES

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Understand basic baking principles



Where all complex reactions that take place during mixing and baking so the student can control these processes

LEARNING OUTLINES

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Mixing and Gluten Development

- *Three phases of the Basic Mixing Process for doughs and batters*
- *Processes that Occur During Mixing*
- *Hydration: The process of absorbing water*
- *Gluten development*
- *Controlling Gluten Development*
- *Methods for Adjusting Gluten Development*

The Baking Process

After Baking



BASIC BAKING PRINCIPLES

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- Mixing
- Gluten Development
- The Baking Process
- After Baking



Mixing



Three phases of the Basic Mixing Process for doughs and batters

1. Blending the ingredients.
    - *Adding liquid to hydrate flour proteins and develop gluten*
2. Forming the dough.
    - *Air is mixed in and helps to strengthen the dough*
3. Developing the dough.
    - *Mixing methods develop gluten and elasticity.*

PROCESSES THAT OCCUR DURING MIXING :

AIR CELL FORMATION

1

- Creates the porous texture of the interior of an item. (interior is referred to as the crumb)
- Necessary part of the leavening process
- When gases from leavening agents are formed, they collect inside the air cells and expand during baking
- No new air cells form when baking. All air cells are formed when mixing
- The length of mixing determines the final texture of the item
  - *PROPER MIXING IS REQUIRED TO GET THE DESIRED TEXTURE*
  - *Over-mixing vs. under-mixing*



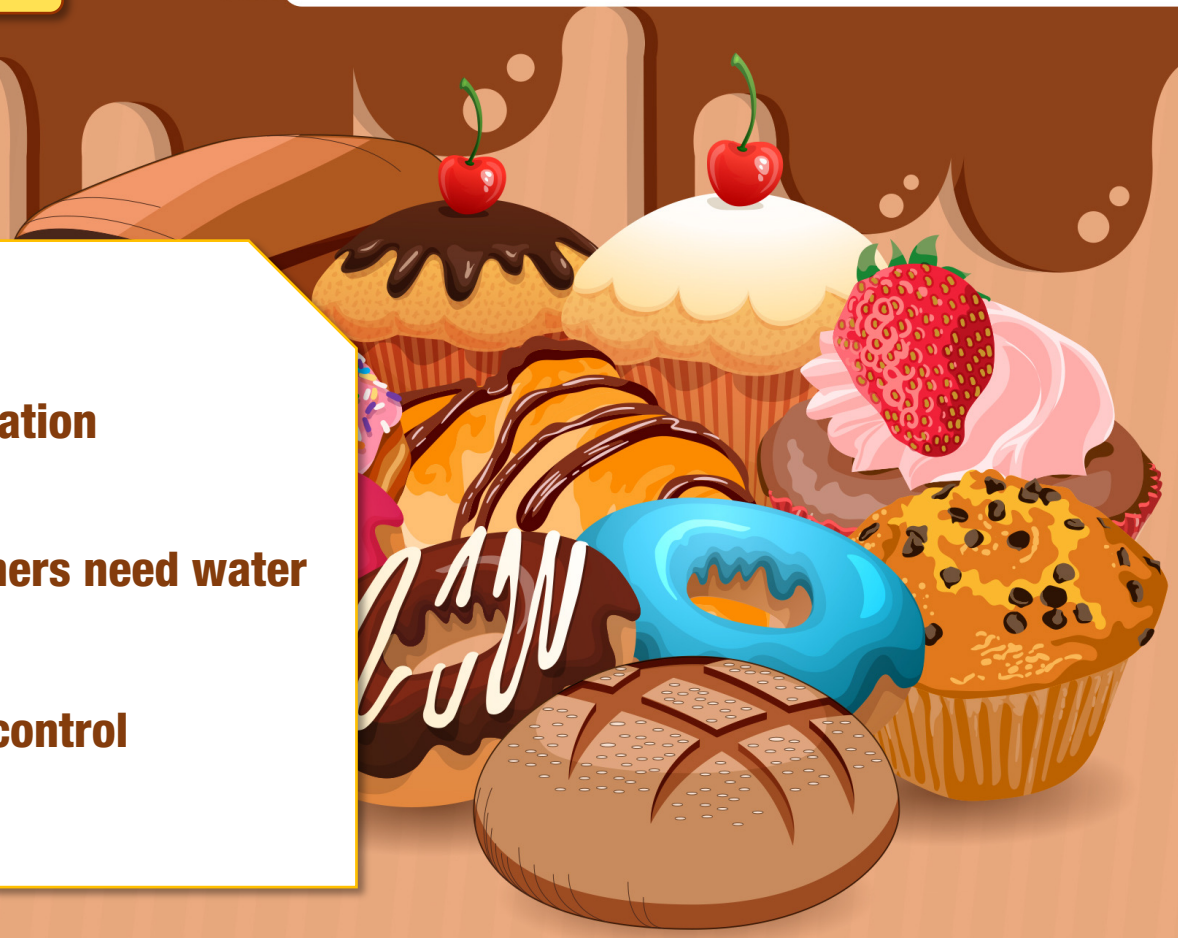
PROCESSES THAT OCCUR DURING MIXING :

HYDRATION - THE PROCESS OF ABSORBING WATER

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- Necessary for dough development and gluten formation
- Other ingredients such as yeast and various leaveners need water to react
- Adjusting water and other liquids allows baker to control consistency & softness of doughs/batter

PROCESSES THAT OCCUR DURING MIXING :

GLUTEN DEVELOPMENT

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- Needed for the structure of baked goods
- Must be able to control
- *Coagulation* is the firming of gluten caused by heat. This gives the firm structure of baked goods

Gluten Development

CONTROLLING GLUTEN DEVELOPMENT

When the proteins found in wheat flour combine with water, they form a stretchable substance called ***gluten***.

Gluten development can be controlled through:

- Selection of flours
- Fat and other tenderizers
  - *Any fat used in baking is called a shortening because it shortens the gluten strands.*
- Water
- Mixing Methods
- Leavening
  - *Expansion of air cells stretches the gluten and strengthens it*
  - *Leavening also tenderizes the product by making cell walls thinner*
- Temperature
  - *Gluten develops more at a warm room temperature than at a cold temperature.*

METHODS FOR ADJUSTING GLUTEN DEVELOPMENT

- Salt: strengthens gluten and controls yeast growth.
  - *Yeast doughs without salt are harder to handle*
- Milk: contains an enzyme that interferes with gluten development.
  - *Milk should be scalded, or heated to a simmer then cooled before be added to a yeast dough*



The Baking Process



1. Melting of fats

- When fats melt it contributes to leavening.

2. Formation and expansion of gases

- As gases form and expand they help to leaven the product

3. Killing of yeast and microorganisms

- When temperature are too high or low. Fermentation will stop.

4. Coagulation of proteins

- Heat causes coagulation of protein. Correct baking temps important. Too high **(oven temp)** coagulation starts too soon and may have poor volume or split crusts, too low **(oven temp)** product may collapse.

5. Gelatinization of starches

- They give bulk to the structure.

6. Escape of water vapor and other gases

- Some of the water turns to steam and contribute to leavening.
- Moisture will always be lost during baking.

7. **Crust formation and browning**

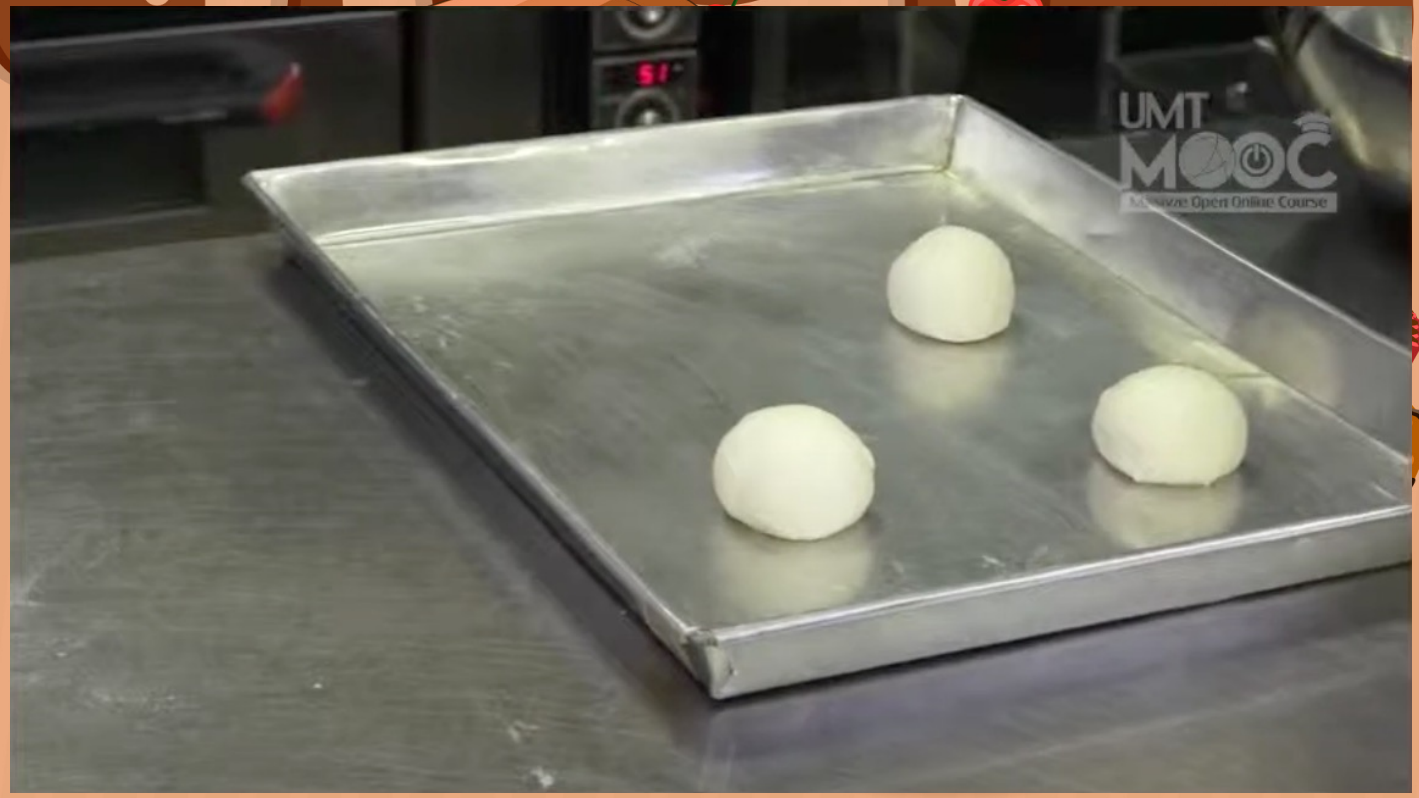
- Crust forms as water evaporates & surface is left dry.
- Browning begins before product is finished rising or interior is finished setting.
- Browning is a chemical change—**Maillard Reaction.** This also contribute to flavor and appearance



After Baking

COOLING

Starches continue to gelatinize and molecules bond with each other and become more solid as the product cools



CONCLUSION

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- What happens when a dough is mixed?
- How does the baker control gluten development?
- What happens when a dough or batter is baked?



Because these concepts are applicable to all flour goods, students should become really intimate with them.

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Thank You



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