Chemical Processes in Food Science

Media Type: DVD
Duration: 23 minutes

Goal: For students to be able to discuss the role and different processes in fermentation, leavening, retrogradation, syneresis and gelatinization in the food industry.

Description:
Cooking is all about chemistry and is nothing more than a series of chemical reactions. This presentation explains the “science” involved in cooking and food preparation. The fermentation process, caramelization, leavening, gelatinization, retrogradation and syneresis are explored, as well as discussing the role starch plays in the cooking process.

Objectives:
1. To explain fermentation, leavening, retrogradation, syneresis, gelatinization and gelation.
2. To discuss the role of fermentation, leavening, retrogradation, syneresis, gelatinization in the food industry.
3. To compare pickling methods.
4. To describe the vinegar making process and bread making process.
5. To demonstrate food production processes while making pickles, sauerkraut, bread, quick breads, meringue and sauerkraut.

Horizontal Alignment

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<thead>
<tr>
<th>Core-Subject Area</th>
<th>Foundation Concept</th>
<th>Basic Understanding</th>
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<tbody>
<tr>
<td>Math</td>
<td>Logical Skills</td>
<td>reasoning; problem solving</td>
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<td></td>
<td>Mathematical Figures and Concepts</td>
<td>fractions; addition; subtraction; computation</td>
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<td></td>
<td>Application of Mathematical Technology</td>
<td>spreadsheets; collecting data; classification/organization skills</td>
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<tr>
<td>Language Arts</td>
<td>Application of Writing Skills</td>
<td>editing/proofreading; organizing logical arguments; utilizing reference materials; vocabulary enhancement</td>
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<td>Analysis of Text, Literature and Information</td>
<td>critical and creative thinking; expression of thoughts and ideas; communication skills; developing listening and comprehension skills</td>
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<td>Technology Applications in Literature</td>
<td>internet-based research; utilizing document and presentation processing software</td>
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<tr>
<td>Science</td>
<td>Scientific Thinking and Investigating</td>
<td>critical thinking; real-world investigations and applications; collecting data; compare/contrast findings; conducting experiments</td>
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<tr>
<td></td>
<td>Scientific Laws and Principles</td>
<td>structures and processes; principles of biology and chemistry; periodic table; food safety; temperature control</td>
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Chemical Processes in Food Science

Class 1: Begin the class by handing out the *Chemical Processes in Food Science* Worksheet and the *Chemical Processes in Food Science Vocabulary Handout*. Show the Introduction, and Fermentation Chapters. Give the instructions of the Fermentation Activity and have the students complete.

Class 2: Show the Leavening and Caramelization chapters of the presentation. Remind the students to use the worksheet and vocabulary handout as a reference. Instruct the students to complete the Leavening and Caramelization Activities.

Class 3: Show the Starches, Gelatinization, Retrogradation & Syneresis Chapters. Instruct the student to complete the Retrogradation Activity.

Class 4: Show the Review Chapter in the *Chemical Processes in Food Science* DVD. Hand out the *Chemical Processes in Food Science Crossword* for the students to complete. Administer the *Chemical Processes in Food Science Assessment*. Give instructions for one of the projects: Food Show, Starch Molecules or Culinary Careers.

Class 5: Allow students to finish their projects and present them to the class.

United States Department of Agriculture—Agriculture Research Service
• [www.ars.usda.gov](http://www.ars.usda.gov)
Food-Info
• [www.food-info.net](http://www.food-info.net)

FCCLA
• Culinary Arts
  • Demonstrate food safety and sanitation procedures.
  • Demonstrate professional food preparation methods and techniques for all menu categories to produce a variety of food products that meet customer needs.
  • Demonstrate professional skill for a variety of cooking methods including roasting, broiling, smoking, grilling, sautéing, pan frying, deep frying, braising, stewing, poaching, steaming, and baking using professional equipment and current technologies.
• Food Innovations

Additional Instructional Strategies
• Fermentation Balloons and Answer Key
• Bread-&-Butter Pickles Recipe
• Chocolate Pie Recipe
Fermentation
The student will research and find a recipe for vinegar, brine pickles or fresh-pack pickles. They will then create a drawing, chart or other visual presentation to show the steps of the recipe. The student should include next to each step the ways fermentation is occurring or how that step will facilitate the fermentation process.

Leavening
The student will view the leavening process while baking rolls or a quick bread. While the student is viewing the leavening process they should take notes so they can create a presentation illustrating the process.

Caramelization
The student will caramelize either sugar or onions by placing either the sugar or onions in a skillet on the stove. The students should use a stopwatch to time how long the total caramelization process takes as well as record when the first browning occurs and the time from first browning to complete caramalization.

Retrogradation
The student will view the retrogradation process by comparing loaves of bread in different storage environments and recording their findings on a poster with a picture of each storage type next to each set of findings.

Food Show
The student will research one of the chemical processes discussed in the presentation and find a food which is an example of this process. The student will then prepare the food and give a two to three minute explanation of how they made the food and the chemical process they chose.

Starch Molecules
The student will create a 3-D representation of the structure of amylose and amyllopectin using different types of candy and toothpicks. The structures for the starches can be found on the presentation or by researching the structure using the Internet.

Culinary Careers
The student will conduct research to find at least ten careers in the culinary industry. Next, the student will choose two careers and compose a job description for each.