Food Chemistry in the High School Classroom

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An Introduction

A video introduction to teaching chemistry through food science, featuring Sally Mitchell.
Dimensional Analysis

Molasses Cookies activity
Where’s the Chemistry?

- Introduction to the concept of the Mole
- Dimensional Analysis exercise
- Scientific naming of chemicals
- Introduction to the Modern Metric System
- Introduction to Stoichiometry
What Exactly is Food Science?

**Food science** is a study concerned with all technical aspects of food, beginning with harvesting, and ending with its cooking and consumption.

**Activities** of food scientists include the development of new food products, design of processes to produce these foods, choice of packaging materials, shelf-life studies, sensory evaluation of the product, as well as microbiological and chemical testing.
How many food science labs do you teach currently?

A. None  
B. 1-2 per year  
C. 3-4 per year  
D. 5-7 per year  
E. All my labs involve food science
Using KOOL – AID to teach solution concepts

- Student challenge: create a molar solution using KOOL-AID
- Rationale for doing the lab this way
Concentrate @ 8M
Dilute 8M to 2M
200mL of solution at ? concentration
Where is the Chemistry?

- Molarity calculations and volumetric flask simulation
- Proper lab techniques - pour from large mouth container to small mouth container
- Tare weight
- Preventing cross contamination - never pour back excess to stock
- Dilution calculations and simulation
- Extensions: Beer's Law (AP Chem)
<table>
<thead>
<tr>
<th><strong>Opinion Poll</strong></th>
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<tbody>
<tr>
<td><strong>Do you currently do a lab on THIS TOPIC in your course?</strong></td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Is this lab an attractive substitute or addition?</td>
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<tr>
<td>Yes</td>
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</tbody>
</table>
Making Cheese
Percent Composition
Lactose Intolerance
Where’s the Chemistry?

- Separation techniques
- Isoelectronic point
- Percent composition analysis
- Qualitative Analysis
Opinion Poll
List one limitation to including food science in a high school chemistry class.

[Type your ideas in the chat]
Eggs

- Poached
- Hard-boiled
- Dissection

Anatomy of an Egg

- Shell
- Yolk
- Vitelline Membrane
- Outer Membrane
- Inner Membrane
- Albumen
- Air Cell
- Chalazae

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Where’s the Chemistry?

- Qualitative Analysis
- Gas Laws
- Physical vs. Chemical Changes
- Chemical Reactions
SUGAR

Isomerism in Sugars
SUGAR

Making Perfect Fudge
Where’s the Chemistry?

- Saturation points -
  supersaturation
- Molality
- Boiling point elevation-
  Colligative Properties
- Collision
  theory/thermodynamics/
  Crystallization
Food-Based Science Fair Projects/ Science Olympiad

- Vanilla extract project
- Aluminum content of baking powder
- Maillard Reaction

- Food Science a Science Olympiad topic for middle school this year
- Qualitative Tests
- Properties and structures of food molecules
- Data Gathering and processing
- Applying chemistry to everyday life

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Opinion Poll 2
List one positive aspect of infusing food science in a high school chemistry class.

[Type your ideas in the chat]
The Big Finale: Making Bread

- Fermentation
- Polymerization
- Gas Laws
- Maillard Reaction
Annotated Bibliography

ChemMatters—
http://portal.acs.org/portal/PublicWebSite/education/resources/highschool/chemmatters/index.htm

Institute of Food Technologists— http://www.ift.org/


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