Say Cheese!
Is there really a difference in cheese?

Target Grade Levels: 11-12
Subject Areas: Chemistry, Physical Science, & Biology
Time Required: 8-10 50 minute classes

Lesson Objectives:

1. Understand and replicate the chemical reactions utilized in cheese making.
2. Understand the transgenic bacteria used to synthesize chymosin and understand why it is safe.
3. Understand from a consumer standpoint which products are “value added” or just overpriced.

Iowa Core Standards:
- S.9-12.PS.11
- S.9-12.PS.12
- S.9-12.SI.1
- S.9-12.SI.2
- S.9-12.SI.4
- S.9-12.SI.5
- S.9-12.SI.7

Lesson Summary

Throughout the year, students are asked to research price points, value added merchandise, and organic versus standard in regards to cheese at various merchants. They are asked to think about questions such as is organic better, is aged cheese different than non-aged, and are “value added” cheeses, those where non-dairy ingredients are included, worth the price points?

Students are also asked to research transgenic organisms, rules and regulations regarding GMO, and public perception. Students are then asked to think about why rennin derived from animal sources such as calves might be an issue and necessitate transgenic bacteria producing chymosin, as well as the safety of this enzyme (and others) produced by transgenic organisms.

Students are then asked to design an experiment testing a hypothesis they have formed based on their research, their discussion with the partner scientist, and critical thinking.

Partner

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Lesson Plans

- Expectations, Groups, & Forming Research Ideas
- Chemistry of Cheese – Reactions, Components, etc.
- Supermarket Research
- Cheese Making Lab – 1 day spread over 3 classes

More information will can be found on lesson plans here:

- http://bkcsd.org/page/3423/7

Online Resources

- Cheese Science
  www.cheesescience.net
- The Chemistry of Cheese
  www.nbc.learn.com/chemistry
- Chemistry Gets Cheesy
  www.student.societyforscience.org/blog/eureka-lab/chemistry-gets-cheesy
- Blessed are the Cheesemakers
  www.rsc.org/chemistryworld/2013/11/cheese-chemistry

Teaching Tips

Preparedness is key to this lesson and corresponding experiments! Be sure to utilize the partner scientist or expert if you have one, front-load knowledge and research, and prepare the students on scientific method.