NEW!

GRADE 7

Lesson	Topic	Learning Objective(s)	Lesson Activity	Life Skills Learning Objective	Connections to Garden Lessons	Academic Standard Connections	Health Standards
Science Collaboration Spherification	Kitchen Behaviors Culinary Flavors and Textures (CFT) Kitchen Tools and Equipment (KTE)	**HC.6.4** Identify where products from different food groups are sourced locally. **HC.6.6** Demonstrate knowledge of whole foods, minimally processed foods and processed foods. **FP.6.1** Demonstrate knowledge of safe food handling practices. **FP.6.2** Name and describe basic cooking techniques and use them as instructed to prepare recipes **KTE.6.1-4** Kitchen Tools and Equipment	Have students explore the kitchen to learn the basic rules and systems. Divide students into teams of two groups to complete lesson on molecular gastronomy: spherification Group 1: will use lemonade Group 2: will use soda Review the tools, ingredients, and procedures. Once the lesson is complete have each team taste their creations and answer questions regarding the lesson.	**PLS.1** Students are self-aware and show respect for their own needs, the needs of others, and the environment. They practice safe and conscientious behaviors in the garden and kitchen environments **CLS.5** Students participate in the development of agreed upon protocols and behaviors for the garden and the kitchen environments. **PLS.4** Students are active and engaged learners who show up on time prepared to learn, and manage their time wisely.	Try using fresh fruit from the garden. Blend or juice and utilize for spherification test.	**NGSS. MS.PS1.B.** Chemical Reactions—Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-5)	**National Health Education Standard 5:** Students will demonstrate the ability to use decision making skills to enhance health.

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SPHERIFICATION

Kitchen

NEW! GRADE 7 | SCHOOL PARTNER LESSON PLAN

PREPARATION

Mixing the Soda and Sodium Alginate:

- Using a hand-held blender or mixing tool, mix the soda or flavored liquid with sodium alginate. This process may take longer than expected, around 5–10 minutes. Let the mixture rest to remove any trapped air bubbles. For the best results, let it rest overnight.

Preparing the Calcium Chloride Solution:

- Using the blender or mixing tool, combine 500 grams of water with calcium chloride until fully mixed. For optimal results, let the solution rest in the refrigerator overnight..

Setting Up the Spherification Station:

- Arrange the following: soda and sodium alginate mixture, calcium chloride bath, tap water rinse, and a holding vessel.

Time Sensitivity:

- These mixtures are time-sensitive. For maximum effect, use within 15 minutes.

PROCEDURE

- Fill pipettes with the juice or soda and sodium alginate solution.
- Gently squeeze the pipettes (syringes or squeeze bottles could also work) to release the solution drop by drop into calcium chloride bath. Be careful not to drop the liquid from too great of a height or they will flatten and resemble small pancakes instead of caviar spheres.
- After you have dropped a small quantity into the bath, remove the spheres from the calcium chloride solution with a small slotted spoon.
- Blot the bottom of the spoon with a towel to remove the calcium chloride solution.
- Place spheres in the water rinsing bath.
- Immediately after rinsing, remove the spheres from the tap water and sample the results.

? ESSENTIAL QUESTIONS

1. Why is it called spherification? *It is the process of turning a liquid into a semi solid sphere or pearl.*

2. How did it first develop? *Originally created as a process for encapsulation in the drug industry for time released medicines.*

3. What is the difference of spherification and reverse spherification? *Both form layers around a liquid, but the reverse process allows for a liquid center which will remain liquid for a longer period of time and allows for a larger size.*

4. Why does a liquid become entirely a solid in spherification and not in the reverse method? *The calcium alginate ions create the outer layer of the shell. The calcium ions are small enough to permeate the shell and continue to gradually turn the alginate liquid into a solid. The process of reverse spherification doesn't behave the same way due to the fact that the alginate molecules are too large to diffuse through the calcium chloride shell. Spherification is time sensitive while reverse spherification is not. The overall theory is that of membrane diffusion.*

5. What is the byproduct of this process?

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