



German prisoners with Canadian troops receiving coffee and biscuits from YMCA hut.

Online Collections Database, 1983.166.27, www.theworldwar.org/research/database. National WWI Museum and Memorial.
Online.

Coffee and World War 1: Soluble Science

Recommended Grade Levels: 6-12

Course/Content Area(s): Science

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LESSON OVERVIEW:	Students will learn about states of matter to understand how instant coffee is made. Through a series of readings and activities, students will discover different processes of making instant coffee, while also considering the impact instant coffee had on the battlefield during WWI.
OBJECTIVES:	<i>Students will:</i>
	<ul style="list-style-type: none"> ● Learn about coffee and the role it had on the WW1 battlefields and the impact of the invention of soluble “instant coffee” ● Develop models to illustrate the difference between spray drying and freeze-drying methods of creating instant and soluble coffee ● Utilize a Computer Simulation to demonstrate phase changes occurring in each method and demonstrate
STANDARDS ALIGNMENT:	<p>Next Generation Science Standards (NGSS)</p> <p>HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.</p>
TIME NEEDED:	45 to 60 mins
INTERDISCIPLINARY:	World History
PRIOR KNOWLEDGE:	<ul style="list-style-type: none"> ● Prior knowledge on solids, liquids, gasses as states of matter ● Awareness of what coffee is ● General overview of WWI
MATERIALS NEEDED:	Student Activity: Soluble Science Coffee and WWI Article

LESSON

PRE-ASSESSMENT/INTRODUCTION/HOOK:

1. Pose the following question for whole-class discussion: When I say the word coffee, what comes to mind?
2. Record student responses on a poster, chart, board or screen for all students to see.
3. Pose the next question for discussion: When I say the word instant coffee, what comes to mind?
4. Record student responses on a poster, chart, board or screen for all students to see.
5. Share [this image](#) of a tin of soluble coffee with the entire class. Ask: How do you think this coffee was created?
6. Students will then complete the [following reading](#) on coffee and World War 1 and answer two questions based on the reading:

1. How many pounds of coffee were rationed to US Soldiers a year?
2. Today we now know soluble coffee as “ ”.

DIRECTIONS:

1. Hand out the [Student Activity: Soluble Science](#) sheet
2. Students will create visual models depicting how instant coffee was made in each scenario.
3. Ask students to consider modern methods of creating instant coffee: Spray Drying and Freeze Drying. Students will complete similar steps for these processes as listed above but will include steps in the process through images.
4. Have students use a [pHET simulation](#) to demonstrate a change in the states of matter and model what is taking place in both the spray and freeze drying methods of production.
 - a. *It is important to note that the pHET model serves to merely demonstrate phase change, not what is actually taking place in the spray dry and freeze dry process. Water molecules will be used as the “medium” to represent soluble coffee grounds.*

POST-ASSESSMENT:

As a post assessment, ask students to select a food item of their choice and conduct research. They should determine what spray drying or freeze-drying method they would use for their food item to preserve it or make it useful. Students should then complete a model similar to what they did with the coffee example above.

MODIFICATIONS/ACCOMMODATIONS

Accommodations: Documents can be printed on demand or done electronically.

Modifications: The pHET simulation can be excluded from the assignment to reduce necessary class time.

Bibliography:

<https://www.smithsonianmag.com/arts-culture/there-future-instant-coffee-180951821/>