

NTTI Media-Rich Lesson

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NAME

Hey, Kool-Aid!

TITLE

Fifth Grade

GRADE LEVELS

Three 45-Minute Class Period

TIME ALLOTMENT

OVERVIEW

Students will investigate two samples of Kool-Aid made with the same amount of water but different amounts of Kool-Aid powder. They will taste both and find that one is too watery or weak and the other is too sweet or strong. This leads them to discover and explore the concept of concentration. They will reinforce their knowledge of concentration by watching *Mixtures and Solutions*, found at <http://peachstar.unitedstreaming.com> and by performing several other Kool-Aid investigations.

In Part 2, the students will make and compare the concentration of salt solutions. Since taste will no longer be an indicator, the students will use balance scales to determine the relative concentrations of the salt solutions.

Concentration expresses a relationship between the amount of dissolved material and the volume of liquid (solvent) in which the material is dissolved. It is the ratio of two materials in a solution. For example, a handful of sugar in a glass of lemonade would be too sweet; a handful of sugar in a pitcher of lemonade would taste about right; and a handful of sugar in 10 gallons of lemonade would not be sweet enough. We commonly refer to solutions with a high ratio of solid material to liquid as being **concentrated** or strong and solutions with a low ratio of solid material to liquid as being weak or **dilute**.

It is important for students to understand the concept of concentration in a systematic way because it's not always possible to taste, smell, or feel solutions. Familiar examples for students may be the amount of salt in ocean water, the



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amount of chlorine in a pool, juices from concentrate, and the concentration of cleaning solutions.

SUBJECT MATTER

Physical Science

LEARNING OBJECTIVES

Students will be able to:

- Explain the concept of concentration
 - Measure volumes of solids and liquids
 - Investigate the behavior of solid materials in water
 - Determine the relative concentrations of solutions
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STANDARDS

Georgia Quality Core Curriculum (QCC's)
www.glc.k12.ga.us

Strand: Inquiry

1-Topic: Science Inquiry, Process Skills, and Problem Solving

Standard: Asks questions, makes and keeps records of observations, classifies objects and events, communicates with others, makes inferences and predictions, uses estimation and measurement, uses evidence to construct explanations, makes sketches and diagrams to explain ideas, organizes data into tables and charts for interpretation, reads and interprets various types of graphs, formulates simple hypotheses, identifies and controls a limited number of variables, and designs a simple experiment.

3-Topic: Safety



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Standard: Identifies and practices accepted safety procedures in manipulating science materials and equipment.

4-Topic: Activities/Tools

Standard: Actively engages in the learning process via hands-on/minds-on science activities and experiences. Uses appropriate tools to collect and analyze data and solve problems.

Strand: Physical Science

6- Topic: Structure of Matter

Standard: Investigates characteristics of length, mass, volume, density, alkalinity/acidity, and temperature. Uses balance scales, thermometers, rulers, litmus paper, and containers to compare characteristics of various objects.

8-Topic: Structure of Matter

Standard: Differentiates between and describes physical and chemical changes in matter. Identifies and demonstrates examples of physical and chemical changes.

MEDIA COMPONENTS

Web Sites

LHS FOSS K-8 Program

www.lhs.berkeley.edu/FOSS

FOSS K-8 has 36 curriculum units for grades K-8 under 4 strands: Life Science, Physical Science, Earth Science, and Scientific Reasoning and Technology.

Peachstar

<http://peachstar.unitedstreaming.com>

Videos can be downloaded at no cost in all areas of science. Specify the grade level and subject.

Physical Science: Mixtures and Solutions

Chem4Kids

www.chem4kids.com

This site provides students with information, definitions, quizzes and puzzles related to mixtures and solutions.

Prep for Teachers



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Prior to teaching this lesson, purchase materials from you local grocery store and obtain a computer, projector, and screen. (Note: You may require speakers as well according to the volume of your projector). Bookmark the websites used in the lesson on each computer in your classroom. Prepare and make copies of a table to record the directions and recipes for the Kool-Aid solutions. (Note: Obtain permission from parent/guardian before lesson for students who have restricted diets.)

MATERIALS

Per class:

- 6 3 oz. paper cups for each student
- 1 can of sugar sweetened Kool-Aid or comparable soft drink mix, 24 oz.

Per group:

- 1 large stirring spoon
- 2 pitchers
- 1 syringe
- 1 balance scale
- 1 set of gram weights
- 1 permanent marking pen
- student recording sheets
- pencils
- white paper

Kool- Aid Concentration Log

Salt Concentration Log

INTRODUCTORY ACTIVITY

Step 1

Announce that you have made the class a treat to taste. Distribute pre-made Kool Aid to students, making sure some students get extra sweet Kool-Aid and



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some get a diluted recipe. (*Obtain permission from parent/guardian before lesson for students who have restricted diets.*) Ask students to share aloud how they enjoyed their drink. Expect varied responses- some will say it didn't taste good, it was weak, it was syrupy, too sweet, etc.

Step 2

Discuss why the tastes were different, introducing the new vocabulary on a chart: concentration, dissolve, dilute, weak, strong, solute, solvent, solution. Hold up the pitchers with the remaining Kool-Aid in each and ask students to observe and record similarities and differences between the two solutions. They should find one is thinner in fluidity and lighter in color. Share observations with a small group or the whole class.

LEARNING ACTIVITY

Step 1

Provide students with a **FOCUS FOR MEDIA INTERACTION**, asking them to record the definitions for new vocabulary: solution, solute, solvent, and universal solvent. **PLAY** the Mixtures and Solutions video clip beginning at time 7:15 when

you see the word Solutions. **PAUSE** each time a vocabulary word appears to give students the chance to record the definition. The word *solute* will appear at 8:18 when you see a pair of hands squeezing a lemon. The word *solvent* will appear at 8:28 when the lemonade is being stirred. The words *universal solvent* will appear at 8:39 when you see the red powder being added to a glass of water. **STOP** the video at 8:39 when you see the soda can and you hear, "This is a property of solutions." **CHECK** to make sure students have recorded the information. **REWIND** the video and **STOP** again at each vocabulary word. **CHECK** to make sure the students can tell which part of the Kool-Aid solution is the solvent and which the solute is.

Ask students what would happen if more or less solute are added. Explain concentration and that adding more solute makes a more concentrated solution, while using less solute makes a diluted solution. Allow students to provide other examples of concentrated solutions. If they have difficulty coming up with examples, prompt them by asking about adding too much sugar to cereal, salt in ocean water, or chlorine in the pool.



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CULMINATING ACTIVITY

Step 1

Tell students that they are now going to determine the best concentration for a Kool-Aid solution. Divide students into groups of 2-4. Distribute the student record log and explain their task of experimenting with different concentrations to recommend a recipe for the best tasting Kool-Aid.

Step 2

Students should make a prediction about which recipe will taste the best. Then students will mix solutions and record the results for each. Finally students will make their recommendation about the best Kool-Aid concentration.

Step 3

Students should now know the relationships between solids and liquids in concentrated solutions. Suggest that sometimes a concentration cannot be determined by taste; for example, in a salt solution. Guide students into discovering that solutions can be weighed if unable to determine the concentration by sight, taste, or smell.

Step 4

Distribute the materials and student record log for the salt concentration experiment. In groups, students prepare salt solutions of varying concentrations. Then students will weigh and record the results on the student record log.

CROSS-CURRICULAR EXTENSIONS

MATHEMATICS

Compare several kinds of powdered drinks to determine which is the most cost-effective. Consider: the amount per serving, the number of servings per package, the cost of the package, and the cost per serving.

HEALTH



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Compare several kinds of powdered drinks for nutritional value. Consider the order in which the ingredients are listed, calories, and fat.

LANGUAGE ARTS

Prepare a poster advertising for the best tasting/most economical soft drink.

SCIENCE EXTENSION

Research the effects of a high salt concentration on living organisms in water.

Community Connections

Take a tour of the World of Coca-Cola (or a local bottling company) and learn about the concentrations of their products.

Invite a chemist to your classroom to demonstrate or discuss concentration.



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