**Liquid to Solid (Freezing) Ice Cream Lesson**

**Grade:** 2nd

**Sequence:** 4th of 5 lessons

**Duration:** 60 minutes

**National Standards**

Content Standard A (K-4):

As a result of activities in grades K-4, all students should develop:

* abilities necessary to do scientific inquiry
* Understanding about scientific inquiry

Content Standard B:

As a result of the activities in grades K-4, all students should develop an understand of :

* properties of objects and materials

*PROPERTIES OF OBJECTS AND MATERIALS*

* Objects have many observable properties, including size, weight, shape, color, temperature, and the ability to react with other substances. Those properties can be measured using tools, such as rulers, balances, and thermometers.
* Objects are made of one or more materials, such as paper, wood, and metal. Objects can be described by the properties of the materials from which they are made, and those properties can be used to separate or sort a group of objects or materials.
* Materials can exist in different states--solid, liquid, and gas. Some common materials, such as water, can be changed from one state to another by heating or cooling.

**NCSCOS Goals**

#### Objective 3.01

Identify three states of matter:

* Solid.
* Liquid.
* Gas.

#### Objective 3.02

Observe changes in state due to heating and cooling of common materials.

#### Objective 3.03

Explain how heat is produced and can move from one material or object to another.

#### Objective 3.04

Show that solids, liquids and gases can be characterized by their properties.

**Objectives**

1. The learner will observe solids and liquids using her or his sense of vision.
2. The learner will write descriptions focused on characteristics of liquids and solids based on observations.
3. The learner will compare observed characteristics of solids and liquids.
4. The learner will measure volumes of solids and liquids.
5. The learner will create mixtures of solids and liquids.
6. The learner will observe changes in state when a liquid becomes a solid.

**Scientific Process:** Students will learn to observe. From these observations, they will learn how to articulate a description. The students will make predictions and confirm and/or refute their predictions. They will learn to follow a step-by-step process. They will also question, which will lead to inquiry based learning.

**Materials**

Ice Cream Recipe

**Ingredients:**

* 1/2 cup milk (it doesn't matter what kind, whole, 2%, chocolate, etc.
* 1 Tablespoon sugar
* 1/4 teaspoon vanilla (you might try other flavorings)

**Method:**

1. Add these to a pint size zip lock freezer bag and zip shut.
2. Place that bag in a larger (quart or larger) zip lock bag
3. Add ice to fill bag 1/2 way, 6 Tablespoons salt (rock or regular)
4. Zip that one shut and shake, turn, toss, and mix the bag. In about 5-10 minutes you will have cold hands and yummy ice cream.

**Procedure**

Before Experiment

1. Students will view the power point presentation that they have created.
2. We will read all the characteristics of the states of matter and view the pictures.
3. We will revisit the T-chart that was started on Day 1 of the unit. We will make any necessary modifications based on what was included in the power point.
4. Connect the questions from the Oobleck lesson to this discussion. Get the student’s input, and figure out as a class that Oobleck is BOTH a liquid AND a solid. Talk about how their ideas about solids and liquids have changed since the beginning of the unit.
5. Tell the students that they are going to be making ice cream! Ask them what state of matter ice cream is. Ask them if they know any ingredients in ice cream. List these ingredients on a piece of chart paper.
6. Make any necessary eliminations or additions to this list.
7. Have the recipe already written on a piece of chart paper. Go through the recipe step by step and label solids and liquids. Talk about how to read and follow a recipe.
8. Discuss what it means for a liquid to freeze.
9. Tell the students they will be working in small groups to change a liquid mixture into a solid.

Experiment

1. Have the students make a prediction of what is going to happen in their science journals with their group before they start making the ice cream.
2. Mix ice cream ingredients according to the recipe.
3. Explain to the students that we will be stopping periodically throughout the ice cream making process to make observations of a class. As scientists, it is important for everyone to make observations at the same time. Have stop watch or timer to stop the students at intervals during the experiment.
4. Give the students a bag of ice and rock salt. Make sure they have mixed their ingredients, and let them begin to shake the bags.

Post-Experiment

1. Students will eat their ice cream.
2. During a whole-group discussion, students will talk about the solids and liquids that became the ice cream (solid).
3. Students will be asked to compare this to all that they have learned about solids and liquids in the previous lesson.
4. Read aloud the book *Change It!* by Adrienne Mason. This book will be a great review of the content of the unit.
5. Page 20 of the book reiterates the experiment that the students have just completed by explaining it and also pointing out that the ice cream can melt back into a liquid.
6. Let the students make any comments on the read aloud.

**Conclusion: (include connection to real-life situations)**

To the student: “Today we have completed our unit on matter. We are going to go around the room and let everyone share something they have learned about liquids…about solids…about gases…about mixtures…about changes….” Let the students discuss their knowledge, and commend them for their hard work and great job on being scientists.

**Assessment or Evidence of Understanding: (include either a rubric or a list of assessment criteria)**

The students will be recording their thoughts in their science journals about which containers they think have the most and least water in them. I will read what each child has written to understand better each student’s thinking behind why they believed a certain container had more or less liquid than another. I will also read their entries after they have seen the water poured from the containers into the measuring cups. From reading their conclusions, I will be able to see whether or not they understood the concept of liquids taking the shape of their containers.

I will also carefully listen and take note of what students say in the class discussions. Oftentimes students can exhibit their understanding or lack of understanding through their comments and actions in a group setting. For students who are less verbal, I will have to rely more on their writing.

**Modifications:**

Some students have trouble articulating their thoughts on paper, especially some of the English Language learners in the class. Encourage students to draw pictures and diagrams to show what they are trying to convey in their journals.

**References/Citations:**

NC Department of Public Instruction. (2004). *North Carolina Standard Course of*

*Study: Grade 2: Science*. Retrieved on October 28, 2006. http://www.ncpublicschools.org/curriculum/science/scos/2004/14grade12

National Academy of Science. (1998). *National Science Education Standards. Grades*

*K-4*. National Academic Press. Retrieved on October 28, 2006. http://www.nap.edu/readingroom/books/nses/6c.html

Enfield, M. (2006). *Ice Cream Lesson Plan for EDUC 514.* North Carolina.