

Physical Science for 3rd Grade Students

Changes In Matter – “*The Big Chill*”

Question/Problem: What physical changes occur in making ice cream? Does the physical change in the ice cream affect its chemical composition?

Standards:

3.2.4.A – Identify and use the nature of scientific and technological knowledge: Provide clear explanations that account for observations and results.

3.2.4.C – Recognize and use the elements of scientific inquiry to solve problems: Generate questions about events that can be answered through scientific investigation.

3.4.4.A – Recognize basic concepts about the structure and properties of matter: Know different material characteristics (e.g. state of matter).

3.7.4.B – Select appropriate instruments to study materials: Develop simple skills to measure and record.

Goals: In this lesson, students expand their awareness of the properties of solids and liquids. Their experience introduces them to the following concepts, skills, and attitudes.

Concepts:

- Solids and liquids can be described by their properties.
- Experiments can be performed to investigate properties of solids and liquids.

Skills:

- Observing the properties of liquids and solids.
- Conducting an experiment to investigate the properties of solids and a liquid.
- Communicating observations and experiences through writing and discussion.

Attitudes:

- Accepting that there is more than one way to describe solids and liquids.
- Developing an interest in investigating the physical world.

Content Objective: Students will be able to know that physical changes don't affect the chemical composition of ice cream.

Process Objective: Students will be able to observe the physical changes that occur in making ice cream, then describe and compare the changes in a data chart.

Background Knowledge:

A physical change is any change that happens to a substance without affecting its chemical composition. That is, its physical appearance may change, including its size, shape, or state (solid, liquid, or gas). For example, steam, water, and ice are three states of a liquid, but regardless of the state, it is still water. In this project, students will make a delicious physical change.

Science Content:

Solids and liquids have observable properties that can be described and compared. Some properties of solids and liquids are shape, color, and texture. These properties can be used to investigate changes in ice cream. A physical science concept studied states that materials can exist in different states.

Materials:

Per student:

1 cup of milk

_ teaspoon of vanilla

1 teaspoon of sugar

1 1-pint zip-up plastic bag

1 1-gallon zip-up plastic bag

ice and _ cup of salt

towels

KWL worksheets

Ice cream worksheets

stopwatch

Frog and Toad Are Friends book

clear bowls

plastic spoons

measuring spoons and cups

Set Induction:

Teacher will read the book, Frog and Toad Are Friends. Following the book, teacher will display scoops of ice cream in a clear bowls so the students can observe the melting ice cream. After the ice cream has melted, teacher asks students what changes have occurred to the ice cream. Students participate in discussion of the changes while tasting the melted ice cream. Discussion questions could include the following: What is the color of the ice cream? How does it taste (texture)? What does it look like? (Teacher lists the answers to later compare list to the properties of solid ice cream) and How can you turn the ice cream that melted over Toad into a solid?

Following the introduction, teacher will present the KWL worksheets and students will individually complete the sections titled, “What I Know about Ice Cream” and “What I Want To Know about Ice Cream.”

Procedures:

1. Students will measure the ice cream ingredients, then mix the milk, vanilla, and sugar in the pint zip-up plastic bag. Be sure it is sealed tightly.
2. Fill the gallon bag with ice and salt.
3. Place the pint bag in the gallon bag.
4. Zip the gallon bag securely.
5. Shake the bag gently or pass it from one hand to the other for about five minutes.
6. Open the gallon-bag and observe the mixture every five minutes in the pint bag. Students record an observation (teacher may tell students that scientists make good observations, so they should also observe closely and record their data accurately.) If it is not solid, re-close the bags and shake again. Continue shaking and recording observations until the milk mixture is solid.
7. Remove the pint bag from the gallon- bag, wipe it clean of the salt-ice mixture, open, and eat!

Safety Precautions:

- * Model for students the proper way to shake the ice bag to prevent bags from hitting other students.
- * Hand mitts may be used while shaking the ice bag to prevent cold hands.
- * Teacher may need to assist students in opening their ice cream to prevent the salt mixture from contaminating the ice cream.

Drawing Conclusions (Oral Assessment/Post Lab):

Teacher will hold a discussion with the students describing the physical changes they observed. What happened to the sugar (a solid)? What caused the liquid (milk) to change to a solid (ice cream)? Although it physically looks different, is your ice cream still just milk, vanilla, and sugar mixed together and frozen? How did the properties of the melted ice cream compare to the properties of the ice cream (as a solid)?

Alternate Procedure:

An alternate procedure is to put a liquid freezer pop (the type that comes from the grocery store enclosed in a plastic strip) in the gallon-bag of ice and salt. Shake and observe the physical change.

Assessment/Post Lab:

In this lesson, students are asked to observe, describe, and compare a solid and a liquid. Students’ oral descriptions and written descriptions of what they know about solids and liquids will provide an assessment of their skills in observing and describing the properties of solids and liquids. An additional assessment worksheet will help students share what they have learned.

Written description: Comparison data chart and KWL (students will complete their chart by writing in the section, “What I Learned about Ice Cream”).

Oral description: Teacher-student discussion sessions.

Teacher Checklist: Use given checklist.

Additional assessment: Use given assessment.

Resources:

Steck-Vaughn Company, Science Projects, Texas. 1997. Pg. 24

National Science Resources Center, STC Meets the Standards, Washington. 1998. Pg. 27-30.

www.usoe.k12.ut.us/curr/science “Phase Change In Ice Cream”

www.dsUPER.net/~zaz/icecream “The Ice Cream Parlour”

Teacher Checklist:

“The Big Chill” Lesson – Physical Science

Date: _____

Student Name: _____

_____ Student correctly measured the ingredients.

_____ Student properly followed ice cream directions.

_____ Student followed safety procedures.

_____ Student observed the physical change that occurred in the bag.

_____ Student knows that though the mixture looks physically different, it's still just milk, sugar, and vanilla mixed together and frozen.

_____ Student can accurately list the properties of liquids and solids.

_____ Student completes KWL chart.

_____ Student completes data comparison chart.



Worksheet – “*The Big Chill*”



Physical Science

Name: _____

Date: _____

1. Describe the changes that you observed. _____

2. What happened to the sugar? _____

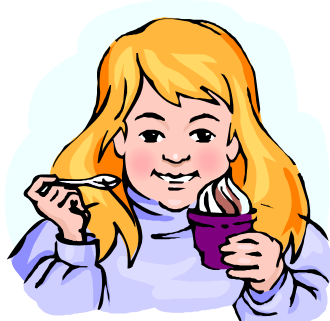
3. What caused the milk to change to ice cream? _____

4. Name one of the ingredients you used in making ice cream. _____

List the properties of the melted ice cream.

List the properties of the solid ice cream.





Assessment Answer Key– “The Big Chill” Physical Science

Name: _____

Date: _____

Rubric:

4 points Student completes lab and worksheet with four observations.

3 points Student completes lab and worksheet with less depth.

2 points Student completes lab and worksheet with difficulty.

1 point Student needs assistance completing lab and assessment.

1. Describe the changes that you observed. The liquid mixture of milk, sugar, and vanilla changed into a solid mixture of ice cream.
2. What happened to the sugar? The sugar dissolved in the milk/vanilla mixture.
3. What caused the milk to change to ice cream? The ice/salt mix surrounding the ice cream ingredients caused the liquid to change to a solid.
4. Name one of the ingredients you used in making ice cream. Milk, vanilla, or sugar would be appropriate answers.

List properties of the melted ice cream.

Students may have varied lists containing:

- Ice cream is smooth
- Ice cream is a liquid
- Ice cream feels wet
- Ice cream is slightly chilled
- Ice cream is creamy (texture)
- Ice cream is runny
- Ice cream can be poured
- Ice cream is the shape of the bowl

List the properties of the ice cream (as a solid).

Students may have varied lists containing:

- Ice Cream feels hard and solid
- Ice Cream is white (color)
- Ice Cream holds its shape (scoop form - malleable)
- Ice Cream retains its shape
- Ice Cream is grainy/bumpy (texture)
- Ice Cream is cold

Physical Science Narrative Summary **on States of Matter**

In this unit, students investigate the similarities and differences in solids and liquids. First, they observe, describe, and compare different solids, focusing on such properties as color, shape, texture, and hardness. They also perform tests to determine whether objects float or sink. Investigations of liquids center on how various liquids look and feel and their rate of evaporation. Finally, students compare the properties of solids and liquids and identify how they are similar and different.

KWL Ice Cream Chart

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W

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