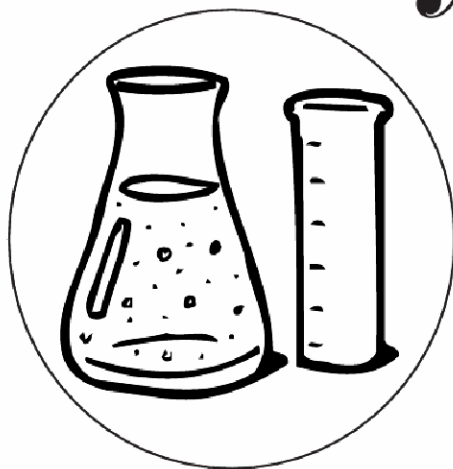


My Lab Book

Chemistry



Name _____ Date _____

1

Creamy Delight



1. Look at your jar of cream. How would you describe the cream? _____
2. Shake the jar for several minutes. Now look at the cream.
3. Shake the jar for several more minutes. What does the cream look like now?

4. Describe the physical change that the cream went through. What caused the change?



Chemistry

Materials

- lab book pages 191–197, reproduced and fashioned into a booklet, one per student
- baby food jars, with lids
- whipping cream
- popcorn kernels
- cooking oil
- test tubes
- aluminum foil
- test tube clamps
- candles
- matches
- safety goggles
- vinegar
- salt
- mustard
- plastic spoons
- sugar
- salt
- flour
- talcum powder
- plastic cups
- toothpicks
- water
- marshmallows
- sticks or skewers
- JELL-O gelatin dessert
- hot water
- mixing bowls
- wooden spoons
- steel wool
- plastic wrap
- measuring spoons
- baking soda
- cotton swabs
- lamp
- bleach
- rubber gloves
- droppers
- old cotton rags
- skim milk
- pot for cooking
- strainer
- scrap paper

Hands-On Science • EMC 5000

Objectives

- observe a variety of physical changes and identify the agent of change
- observe a variety of chemical changes and identify the agent of change
- use an emulsifier to improve salad dressing
- experiment to determine which of four chemicals dissolve in water
- use experimental results to identify an acid
- use an acid to write a secret message and heat to reveal it
- observe the chemical reaction that bleach produces in cotton
- make homemade glue

Preparation

Collect a number of test tubes and test tube clamps. Also collect safety goggles for students to wear while handling the test tubes over a flame.

You will need access to a refrigerator (pages 7 and 8) and a stovetop or hot plate (page 13). Make arrangements as needed. You will also need a lamp with an exposed bulb (page 11).

Warn students to use extreme caution when working with open flame. They should always wear their safety goggles and pull back long hair. Also remind them to use caution when handling bleach.

Collect a number of old rags that students can use to experiment with the effects of bleach.

Background Information

Substances can undergo physical and chemical changes. Physical changes do not produce new substances. Chemical changes do. So melting butter, for instance, is a physical change, while burning paper is a chemical change. One way to distinguish between the two is to ask yourself if the change can be reversed. Physical changes can be reversed. Most chemical reactions cannot.

Heat is one common agent of physical and chemical changes alike. It can melt butter (physical change) and caramelize sugar (chemical change). Motion is another (stirring, shaking). Some chemicals react chemically when mixed. Bleach reacts with the dyes in clothing. Iron reacts with water and air to produce rust. Vinegar reacts with baking soda to produce carbon dioxide gas.

6 **Campfire**

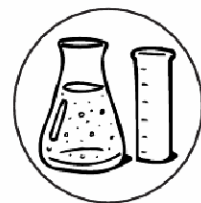


1. Look at your marshmallow. How would you describe it?

2. Put your marshmallow at the end of a stick. Hold the marshmallow over a candle flame. What happens to the marshmallow?

3. A marshmallow is made out of sugar. How is this activity connected to the activity you did on page 5?

7 **JELL-O (1)**



1. Look at the gelatin. How would you describe it?

2. Pour the gelatin into a mixing bowl. Add the hot water and stir.

3. How would you describe the gelatin now?

4. Now add the cold water and stir. How would you describe the gelatin now?

5. Put the gelatin in the refrigerator for several hours.

8 **JELL-O (2)**



1. Take the gelatin out of the refrigerator. Scoop out some of the gelatin and hold it.
2. How would you describe the gelatin now?

3. Describe all the physical changes that the gelatin went through as you made the JELL-O.

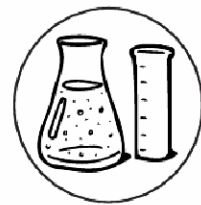
9 **Metal and Water**



1. Look at the steel wool. What color is it? _____
2. Add about a teaspoon of water to one cup. Cover the other cup with plastic wrap. Let the cups sit for several days.
3. What changes do you notice in the cups?

4. Describe the chemical change that took place in the cup and what caused it.

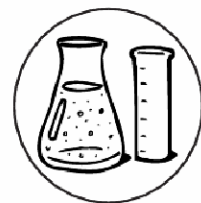
12 Bleach



1. Put on rubber gloves. Be careful not to spill bleach on your clothes.
2. Put a few drops of water on one part of the cloth. Put a few drops of bleach on another part.
3. What happened to the cloth?

4. Which liquid created a chemical reaction in the cloth? What evidence do you have?

13 Ooey Gooley



1. Watch as your teacher curdles the milk and separates the curds.
2. Once the curds are dry, your teacher will stir in baking soda and water.
3. What does this stuff look like to you? Does it remind you of anything?

4. Rub some of it on a piece of scrap paper. Fold the paper over and leave it for a few minutes. Then try to unfold it.

5. What is the stuff you made? _____

2 Hot Corn

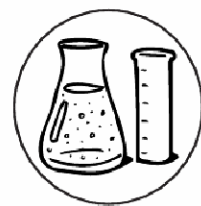


1. Look at the corn kernel. How would you describe it?

2. Put one corn kernel into the test tube with oil. Cover the tube with aluminum foil.
3. Use a clamp to hold the test tube over a candle flame.
4. What happens to the kernel after a few minutes?

5. Describe the physical change that the kernel went through. What caused the change?

3 Salad Dressing



1. Pour some oil into your jar. Now add some vinegar.
2. Shake the jar. Is there anything wrong with your salad dressing?

3. Pour some vinegar into another jar. Add a pinch of salt and a bit of mustard. Shake the jar for a minute. Now add some oil. Shake again.
4. How does your salad dressing look now?

5. How did the salt and mustard help?

Lab Book Instructions & Answers

Page 1: Distribute a jar half full of whipping cream to each student or group. 1) It is a thick liquid. 3) It is fluffy, no longer a liquid. 4) It changed from liquid to semisolid. Shaking the cream back and forth.

Page 2: Distribute a corn kernel, a test tube with a drop of cooking oil in it, a small piece of foil, a test tube clamp, a candle, matches, and safety goggles to each student or group. 1) It is small, round, brown, and hard. 4) It popped. 5) It changed from small, round, brown, and hard to big, white, and fluffy. Heat caused the change.

Page 3: Give each student or group a jar and access to bottles of oil and vinegar, salt, and mustard. 2) The oil and vinegar don't mix well. 4) more mixed together; 5) They made the oil particles smaller, so they mixed with the vinegar better.

Page 4: Distribute a small amount of sugar, salt, flour, and talcum powder in plastic cups to each student or group. Also distribute four cups of water and a toothpick. 2) Sugar, salt, and flour dissolve; talcum powder does not.

Page 5: Distribute a small amount of sugar in a cup, a test tube, a test tube clamp, a candle, matches, and safety goggles to each student or group. 1) white and made up of individual crystals; 2) It melts and turns brown. 3) The sugar changed from white and individual crystals to brown and liquid (then hardened). Heat caused the change.

Page 6: Distribute a marshmallow, a stick, a test tube, a test tube clamp, a candle, matches, and safety goggles to each student or group. 1) It is fluffy and white and soft. 2) It browns and gets hard on the outside. 3) In both cases, heat produced a chemical reaction that changed the sugar.

Page 7: Distribute one package of JELL-O, a mixing bowl, and a wooden spoon to each group. They will need access to hot and cold water. Have students follow the directions on the package. 1) It is a powder. 3) It is a hot liquid. 4) It is a cool liquid.

Page 8: Give each group their container of JELL-O. 2) It is a wiggly solid. 3) It turned from a powder to a liquid when I added hot water. It became a cooler liquid when I added cold water. It became a solid after it cooled in the refrigerator for several hours.

Page 9: Give each student or group a piece of steel wool in each of two cups, a piece of plastic wrap, and access to water. 1) gray; 3) The steel wool with water in its cup is rusting. The other one is not. 4) rusting; water and air caused the reaction.

Page 10: Distribute one cup of water and one cup of vinegar to each student or group. They will need access to the baking soda. 3) Water and baking soda produce no reaction. Vinegar and baking soda produce fizzing. 4) Vinegar is an acid. It reacted with baking soda to produce bubbles of gas.

Page 11: Give each student a cup of vinegar and a cotton swab.

Page 12: Prepare a dropper of bleach and a dropper of water for each student or group. Distribute the droppers in a plastic cup, along with rubber gloves and a piece of cloth. 3) The drops of bleach made the cloth white. The water just made it wet. 4) the bleach; it changed the color of the cloth.

Page 13: Heat 470 mL of skim milk mixed with 6 Tbsp. of vinegar until the milk curdles. Let the milk cool; strain off the curds. Mix the curds with 60 mL of water and a level tablespoon of baking soda. Mix. 3) glue; 5) glue.

4 Dissolving



1. Use a hand lens to look at the four chemicals in front of you. Describe each one.
2. Mix each chemical into a cup of water and stir. Which ones dissolved?

Chemical	Description	Dissolves in Water?
1		
2		
3		
4		

5 Heating Sugar



1. Look at the sugar in front of you. How would you describe it?

2. Put some sugar in a test tube. Use a clamp to hold it over a candle flame. What happens to the sugar?

3. Describe the chemical change the sugar went through and what caused it.

10 Acids in Action



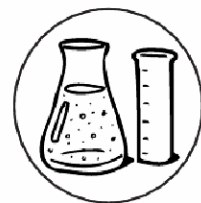
1. Look at the two cups in front of you. One contains water. The other contains vinegar.
2. Pour a small amount of baking soda into each cup.
3. Describe what happens in each cup.

water: _____

vinegar: _____

4. Acids react with baking soda to produce bubbles of gas. Which liquid do you think is an acid, water or vinegar? How do you know?

11 Secret Message



1. Use a cotton swab and vinegar to write a secret message below.

2. Have your partner hold the message over a hot light bulb. Could he or she read it? What did your partner's message say?
