Grade Level: 5th Grade

Title of Lesson: Chemical and Physical Changes Stations

Unit Title: Chemical and Physical Changes

Performance Standard(s) Covered:

S5P2. Students will explain the difference between a physical change and a chemical change.

a. Investigate physical changes by separating mixtures and manipulating (cutting, tearing, folding) paper to demonstrate examples of physical change.

c. Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change.

Essential Question: What is a physical change and what is a chemical change?

Objective: The objective of the lesson is to help students differentiate between a chemical and physical change.

Key Words and Terms:

- Physical change: a reversible change that affects the physical properties of a substance
- Chemical change: an irreversible reaction that affects the composition of a substance

Learning Activity

Abstract (limit 100 characters): Two mini physical change experiments and two mini chemical change experiments to help the student understand the differences.

Materials Needed for Each Group:

- Station 1: Baking Soda and Vinegar
    - 1 graduated cylinder
    - 1 balloon
    - 4 oz vinegar
    - 2 tablespoons baking soda
    - funnel
- Station 2: Paper Chromatography
    - 1 black marker for each student
    - 1 strip of coffee filter for each student
    - 1 small cup for each student
    - 1 oz vinegar for each student
- Station 3: Elephant Toothpaste
    - 16 oz empty plastic soda bottle
    - ½ cup 20-volume (6%) hydrogen peroxide
    - Squirt of Dawn dish detergent
    - 1 teaspoon yeast dissolved in approximately 2 tablespoons very warm water
    - 3-4 drops of food coloring
    - Funnel
    - Foil cake pan
- Station 4: Can a person fit through a piece of paper?
    - couple sheets of construction paper for each student
    - 1 pair of scissors for each student

Safety Concerns:

- Station 1: Make sure that the students are careful when handling the materials and that they do not eat any of them.
- Station 2: Make sure that the students do not ingest any of vinegar.
- Station 3: Make sure that the students are careful when handling the materials. Safety glasses are a good idea since the elephant toothpaste will shoot up.
- Station 4: Make sure that the students are safely handling the scissors.

Procedure:

Plan ahead the groups of students and how long each station will be (about 10 minutes).

- **Station 1:** Baking Soda and Vinegar

1. Before starting the activity, ask the students to predict what will happen when baking soda to the vinegar.
2. Fill the graduated cylinder with the vinegar.
3. Use the funnel to put the baking soda into the balloon.
4. Put the balloon around the top of the graduated cylinder and pour the baking soda into the vinegar.
5. Have the students write down their observations during the reaction. Discuss that it is a chemical change because the baking soda and vinegar are reacting and creating a gas.

- **Station 2:** Paper Chromatography

1. Pass out a strip of coffee filter and a cup containing small amount of vinegar to each student.
2. Have each student draw a horizontal line with the black marker about an inch from the bottom of the coffee filter.
3. Have the students place the bottom edge of their coffee filter into the vinegar and make sure that the black line is not in the vinegar.
4. Wait until the ink has traveled ¾ of the way up the strip to remove it from the vinegar.
5. Have the students write down their observations. Discuss whether or not if it was a chemical change or a physical change.
6. Explain that it is a physical change because black ink is actually made up of the three primary colors and that the vinegar just separated the inks rather than make something new.

- **Station 3:** Elephant Toothpaste:

1. In center of the cake pan, stand up the plastic soda bottle.
2. Add the food coloring to the hydrogen peroxide. Then use the funnel to add the peroxide to the soda bottle.
3. Add a squirt of Dawn dish soap to the soda bottle.
4. Pour the yeast mixture into the soda bottle. Quickly remove the funnel.
5. Have students record their observations about what is happening. The students can touch the bottle and feel that it is warm. Discuss whether or not if it was a chemical change or a physical change.

6. Explain that a chemical change took place because the peroxide and dish soda reacted to make oxygen bubbles. Also the release of heat indicates that a chemical change occurred.

- **Station 4:** Can a person fit through a piece of paper?

1. Hand each student a piece of construction paper and a pair of scissors.
2. Tell the students that one piece of paper can be cut so that a person can fit through it.
3. Then allow the students try to figure it out. Directions: http://www.wikihow.com/Pass-Your-Body-Through-a-Sheet-of-Paper
4. While they are folding and cutting the paper, ask whether they are performing a chemical or physical change to the paper. Discuss why they are performing a physical change to the paper by just folding and cutting it.

Notes and Tips: We had a worksheet that the students filled out at each station and it was helpful. It asked if it was a physical or chemical change and why. It also had an area for the students to record their observations. We also had 4 adults, one at each station, to direct the groups with the activities. One suggestion would be to have time at the end to have a class discussion about each mini experiment to make sure that the class understood the differences of chemical and physical changes.

References:

Station 1: http://www.education.com/science-fair/article/balloon-gas-chemical-reaction/

Station 2: http://www.scienceprojectlab.com/paper-chromatography-experiment.html

Station 3: http://www.stevespanglerscience.com/lab/experiments/elephants-toothpaste

Station 4: http://www.wikihow.com/Pass-Your-Body-Through-a-Sheet-of-Paper