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Best Lesson

Grade Level: Fifth Grade

Title of Lesson: Vinegar and Baking Soda Rockets

Unit Title: Changes of Matter

Performance Standard(s) Covered: S52: Investigate the properties of a substance before, during, and after a chemical reaction to find evidence of change

Essential Question: When mixing two substances, how can we know if a physical or chemical change has occurred?

Objective: The goal of the lesson is to demonstrate the difference between a physical and chemical change. By the end of the lesson, the students should be able to identify properties of a physical change and properties of a chemical change.

Key Words and Terms: Matter, Physical Change, Chemical Change, Reaction, Mixture

Learning Activity

Abstract (limit 100 characters): Today the students will be formed into groups of three and each group will create their own "rocket." The student's will be given tape, pencils, three pairs of goggles, an empty water bottle, a cup of vinegar, half a cup of baking soda, a paper towel and a cork wrapped in one layer of duct tape. The students will use these materials to construct their own "chemical change rocket." Prior to constructing their rocket, the students will create a list of chemical and physical change properties. This list will serve as a tool to guide their understanding of the lesson.

Materials Needed: Each Group of three students will need:

1 Paper Towel (Borrowed from home)

3 Pairs of Goggles (Borrowed from fellow science students)

1 Empty 20oz Water Bottle (Found at house)

1 Cup of Vinegar (Bought for $2.00 at Target)

1/2 Cup of Baking Soda (Bought for $1.50 at Target)

1 Cork wrapped in one layer of duct tape (Simply wrap the cork from a wine bottle in tape once. This helps to seal the rocket off and create pressure inside of it)

4 Pencils (Found at home)

4 Pieces of Duct Tape (Found at home)

One Whiteboard (To record properties of physical and chemical changes)

One Dry Erase Marker (Home)

Safety Concerns: The rocket launches quickly and very fast. Make sure to assist each group with the preparation of the launch, and make sure all students are at least ten feet away wearing goggles.

Procedure:

1. Begin by collecting all materials needed. Have enough for the entire class to split into groups of three. Groups of three works best because each student in the group can have a job.
2. Ask the students if they know the difference between physical and chemical changes. What do physical and chemical changes effect? List some characteristics of physical changes and list some characteristics of chemical changes. Record the students list on the whiteboard for reference throughout the lesson.
3. It is now time to assemble the "rocket." Ask each student to place on their safety goggles. Assign each student in the group a number 1-3. Ask student number one to tape four pencils onto the water bottle so that they may act as a "stand." The water bottle must be able to stand open end down without tipping over.
4. Holding the assembled rocket, ask student 1 to pour the cup of vinegar into the bottle.

5. Placing the bottle down, ask student 2 to lay out the paper towel flat on the ground. Then ask the student to pour the 1/2 cup of baking soda in a straight line down the middle of the paper towel. Tell the student to roll up the paper towel like a burrito, trapping the baking soda inside.

6. Ask student 3 to pick up the cork and wrapped paper towel. Tell them to drop the paper towel into the bottle and to plug the bottle with the cork tightly.

7. Take the bottle from the student and place on ground, bottom end down.

8. Tell the students to step back from the rocket and observe the change occurring inside of the rocket.

9. Once the baking soda and vinegar have thoroughly mixed, enough pressure will have built up inside of the bottle to cause it to "take off." The bottle should launch into the air leaving the cork behind.

10. Collect the bottle with the students and ask whether a physical or chemical change has occurred inside the rocket. The correct answer is chemical and you can hint this to them by mentioning the chemical reaction they have seen.

11. Clean up the wet napkin residue that is left behind and collect the cork.

Notes and Tips: **DO THIS OUTSIDE** A good way to save money for this lesson is to reuse the cork and the rocket. However, it does take away from the experience some if you do not build the rocket with the group. Do one group at a time because it is too difficult to monitor the entire class doing this experiment.

References: I did not find this lesson online anywhere but I did find videos showing the experiment. Here is a link to one.

http://www.youtube.com/watch?v=tGp7jn6iDMg (I modified it from this of course)

Repeating this Lesson: If I were to do this lesson there is only one thing that I would tweak. Some of the students thought it would be funny to see how close they could stand to the rocket without getting hit/wet. If I were to do this lesson again, I would rope off an area that the students had to stand behind to be in the "safety zone."