

Chemical or Physical?

4th Grade

Jeremy White, Brent Greene, & Kathleen Waugaman

References:

- “Matter, Physical and Chemical Changes” lesson plan from 4th grade curriculum guide

Benchmarks:

PS-1 & PS-2 (Benchmark A): Identify characteristics of a simple physical and chemical change. SI-1 (Benchmark A): Select the appropriate tools and use relevant safety procedures to measure and record length, weight, volume, temperature, and area in metric and English units. SI-3, 4, 5, 6 (Benchmark C): Develop, design, and safely conduct scientific investigations and communicate the results. SWK-3 (Benchmark B): Explain discrepancies in an investigation using evidence to support findings.

Objectives:

This lesson allows the students to use calcium carbonate with various liquids to observe the reactions. The students will determine if it is a chemical change, a physical reaction, or no reaction at all with the oil. Students will record their observations and use the data to analyze and interpret the reactions.

Materials:

Initial Demonstration:

- 2 Antacid tablets
- 1 Large clear cup
- 3 or 4 raisins

For the Experiment: (Materials are per pair of students)

- 3 Antacid tablets
- 3 Clear cups
- Water
- Lemon Juice
- Cooking oil
- 3 Small paper cups
- Masking tape
- Marker
- Safety goggles
- Eyedroppers
- Student lab sheet (**Found in Student Journal**)

Initial Demonstration:

Add 2 antacid tablets to a cup of water, followed by 3 or 4 raisins. Let the students observe the raisins “dancing,” going up and down in the water due to the bubbles from the antacid. Do not give too much of an explanation. Let the students discover and ask questions during the lesson. Write the questions on the board. Revisit the questions afterwards to see if the students can answer their questions. This could possibly incorporate a writing activity.

Target Observations:

- The raisins bounce up and down within the cup.
- Bubbles rise up from the antacid tablets when placed in the water.
- The antacid tablets get smaller over time, indicating a reaction.

Target Model:

- A chemical change requires the interaction between two substances, where at least one new substance is formed. The new substance has chemical properties and it is difficult to reverse the change. Several clues indicate a chemical change, including: color changes, release of heat or light, and the formation of a gas.

Procedure:

Per pair of students, have them collect all the materials needed, as listed above in the materials section. The paper cups will be used for water, oil, and lemon juice. Discuss safety issues and have students wear goggles to protect their eyes. Tell the students they will be working in pairs to set up their experiments. Also inform them that they will be testing the affect of different liquids on antacid tablets to see if any create a chemical change. Remind them that there are several clues that indicate a chemical change is taking place.

Students will put a piece of tape on each cup and label the cups with the following: cup 1 – water, cup 2 – lemon juice, cup 3 – oil, and cup 4 – air. Students will place one antacid tablet in each cup. To the first cup, add water with the eyedropper, drop by drop, until the antacid tablet is covered. Observations should be recorded in the data table on lab sheet. Repeat this step for cup 2 using the lemon juice, followed by cup 3 using the cooking oil. In the table, students should indicate whether a chemical reaction took place in cup 1, 2, or 3. Students should discuss their results with the others at their table. Explain any discrepancies in the experimental data and why they think they occurred.

Target Observations:

- Water made the antacid tablet bubble and fizz, while the tablet broke apart.
- Lemon juice also caused the tablet to bubble and fizz quite vigorously.
- Cooking oil caused the formation of very small bubbles on the tablet.

- Air was the only cup that did not have a chemical change, where as the other three had chemical changes.
- Physical changes were observed in the first three cups as well.

Summary:

After having studied physical changes, students should be able to determine that chemical changes require the interaction between two substances, where at least one new substance is formed. The new substance has chemical properties that are permanent and difficult to change back into the original substance. Students will also learn ways to differentiate between the two types of changes with things like color changes, release of heat or light, and the formation of a gas.