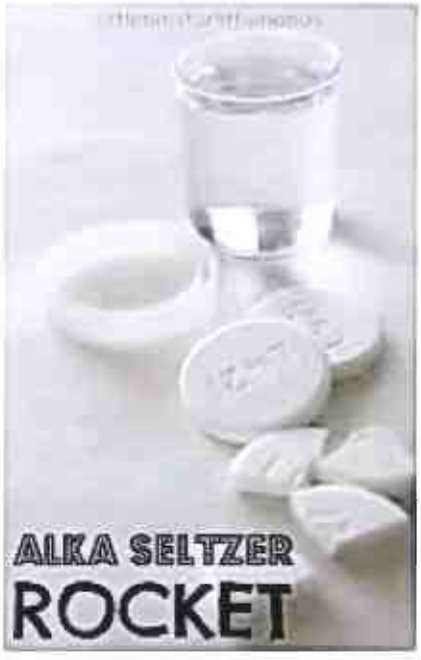
Rocket, Volcano, and Color Changing Milk

PSS Kit Number 8

Description Explore Solid, Liquid, and Gas through rockets, volcanoes, and coloring changing milk.

Kit Contains

6 Packets of Instant Milk
1 Plastic Bottle
2 bags Film Rolls
2 bags of Q-tips
8 Alka-Seltzer Tablets
1 500mL Beaker
1 250mL Beaker
2 50mL Beaker
Lesson Plans



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Color Changing Milk

MATERIALS NEEDED:

- Spill Trays
- Pie Tin or Bowl (not provided)
- Powdered Milk
- Water
- 500 mL Beaker
- Food Coloring
- Q-Tips
- Paper & Pencil (record questions & results)
- Assessment Recording Sheet

***This investigation takes preparation. Use the trays to minimize clean up.**

- Mix approximately half of the powdered milk from one package with two cups of water in the 500 mL beaker. Save the rest of the powder to use another time. *What liquid do you think this is? Why do you think that? What does it look like? What does it smell like?*
- Let them pour 1 cup of milk (very carefully) into the pie tins/bowls. Give a quick demonstration on how to gently place a drop of food coloring into the milk then, allow the children to add more. Both the milk and the food coloring are liquids. Two liquids mixed together are called a solution. *What do you think will happen when you put two liquids together? Why do you think that?*
- Have the students make observations of the reaction. Give a Q-tip to each student. First have them touch the dry end of the Q-tip into the milk solution. *What happened to the milk? What happened to the color?*
- Dip the other end of the Q-tip into the dish soap, and then carefully touch that end into the milk solution. Remind the children not to move the Q-tip around when they touch the end into the milk. *What happens? What are the colors doing? Why do you think the colors are mixing together? How do the results compare to what you predicted would happen? What do you think would happen if you put the Q-tip in another place in the pie tin?*
- Compare the results to their predictions.
- Milk solution can be poured down the drain at the conclusion of the activity.

Explanation of the Color Changing Milk:

Milk contains small droplets of fat or lipids. The amount of suspended lipids correlates with the milk classification of non-fat, skim, 1%, 2% and whole milk. Whole milk has about 16x more milk fat than non-fat milk. The molecules in the soap are attracted to milk fat and move around in a chaotic pattern to try and connect to them. The food coloring is not part of the reaction but gets pushed around in the process. This is what creates the swirling color pattern. You could extend this experiment and try it with different types of milk, including almond and soy milk.

Liquid + Liquid = Liquid

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Alka-Seltzer® Rockets

MATERIALS NEEDED:

- Spill Trays
- Clear Film Canister
- Water
- Alka-Seltzer Tablets
- Paper & Pencil (record questions & results)
- Assessment Recording Sheet

***This investigation takes a few minutes of preparation. Use the trays to minimize clean up.**

- Take one piece of Alka-Seltzer and break it into fourths. Take a clear film canister, and fill it 1/3 full of water. Ask the students if they have ever seen Alka-Seltzer before. *What do you think it does? What do you think will happen when the solid tablet is added to the liquid water?*
- Drop a 1/4 of the Alka-Seltzer tablet into a cup of water to demonstrate. *What is happening? What is the water doing? Do you see bubbles? How does this compare to your prediction?*
- Take the students outside, and make sure all students are 10 big steps away from the rockets. Explain that you are going to add the piece of tablet to the water in the canister, put the lid on, shake it up and then turn it upside down. *What do you think will happen?*
- Compare the results to their predictions. Repeat the experiment with different amounts and temperatures of water.
- The tablet reminants can be used again.

Explanation of the Alka-Seltzer® Rocket:

Alka-Seltzer® tablets are made of sodium bicarbonate (baking soda) and citric acid. When the sodium bicarbonate mixes with water, CO_2 gas bubbles are given off (similar to the three state reaction experiment). The gas bubbles are trapped inside of the canister, creating greater air pressure. The gas pushes on both the canister and the lid equally. When the pressure is greater than the lids seal can resist, the gas will escape, pushing on the lid and canister in opposite directions. The lid is blocked by the ground, but the canister is free to move, causing it to shoot upwards. This is a demonstration of Newton's Third Law of Motion, which states that for every force there is an equal force in the opposite direction.

Liquid + Solid = Gas

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Three-State Reaction (Bubbling Volcano)

MATERIALS NEEDED:

- Spill Trays
- 50 mL & 250 mL Beakers
- Baking Soda
- Food Coloring
- Spoons
- Paper & Pencil (record questions & results)
- Assessment Recording Sheet

***This investigation takes preparation. Use the trays to minimize clean up.**

- Have a student put approximately 20 mL of baking soda in the small beaker. Make sure the spill tray is underneath it! Have another student pour approximately 100 mL of vinegar in the medium beaker. Food coloring can be added to the vinegar if you choose. *What do you think the liquid is? Does it smell funny? Have you smelled that before? What do you think the solid is? What color is it? What will happen when they mix the two together? Why do you think that?*
- Choose another student to slowly pour the vinegar into the small beaker. Describe the reaction using sounds, smell and appearance. *How do the results compare with your predictions? Where does the gas in the bubbles come from?*
- Allow them to repeat the experiment. Encourage them to make alterations with new predictions.
- The baking soda and vinegar mixture can be poured down the drain at the conclusion of the activity.

Explanation of the 3 State Reaction:

Mixing vinegar and baking soda creates an acid/base reaction. The vinegar is the acid, and baking soda is the base. Some of the atoms from the vinegar and baking soda combine to form carbonic acid (H_2CO_3). This molecule quickly degrades or falls apart into H_2O (water) and CO_2 (carbon dioxide). There is another chemical created in the reaction called sodium acetate. The carbon dioxide is a gas at room temperature and creates the bubbles in the reaction.

Liquid + Solid = Gas

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