WE ARE SCIENTISTS

DIY SCIENCE

Exciting Experiments for Young Explorers

WE ARE SCIENTISTS • 2025

Safety first!

You should *always* ask an adult to help with your experiment. Remember to protect your eyes, skin and clothes by using your personal protective equipment like safety glasses, gloves and an apron. Do not eat anything in your experiments. Be careful when handling hot liquids or sharp objects.

Am I really a scientist?

YES! Asking questions and finding ways to answer them is what makes a scientist. You are reading this booklet so it's clear that you are curious, creative, adventurous and strategic.

Tips for thinking like a scientist

Prioritize safety
Always put the safety of yourself and those around you first. Make sure you know what to do if something goes wrong. If it can't be done safely, DON'T DO IT!!

Approach problems with critical thinking
Question everything!! Investigate situations using available resources. Make an educated guess to solve the issue. Use evidence to support or refute your answer.

Respect the environment
Remember, we only have one Earth. Cleaning up after your experiment and reducing waste are a HUGE part of being a scientist.

SLIME CHEMISTRY

Polymers are very large molecules made up of a chain of many smaller molecules linked together. Elmer's Glue is made of up of very long, straight polymers that can slide across each other easily, making the glue runny and watery. When you mix the glue with borax, it makes connections between the chains in a process called crosslinking. This makes it more difficult for the polymer chains in the glue to slide around, so the glue becomes thicker and turns into slime.

MATERIALS NEEDED

- ¼ cup Elmer's Glue (or any washable glue containing polyvinyl acetate)
- ¼ cup water
- ¼ teaspoon baking soda
- 2 tablespoons contact lens solution (containing boric acid and sodium borate)
- Mixing bowl
- Spatula
- Resealable plastic bag
- *Optional*: Food coloring

PROTOCOL

- In the mixing bowl, add ¼ cup of water, ¼ cup of glue, and a few drops of food coloring (optional).
- Add ¼ teaspoon of baking soda and mix thoroughly with the spatula.
- Add 2 tablespoons contact lens solution and stir vigorously until the mixture comes away from the sides of the bowl.
- Use your hands to knead the slime for 5-10 minutes until the texture stops changing.
- Store slime in a resealable plastic bag.
- You can try adding glitter, glow-in-the-dark paint, or shaving cream at the beginning of the process for different fun slime versions!

HOMEMADE LAVA LAMPS

Ever heard the phrase “oil and water don’t mix”? That’s because of density, essentially how heavy a particular liquid is. However, with some chemical help, you can change the density of water to create a bubbling lava lamp!

Water is denser than vegetable oil, so it sinks to the bottom while the oil remains on top. Alka-Seltzer tablets contain a chemical call sodium bicarbonate and an activation acid. When it comes into contact with water, it reacts to create a gas – carbon dioxide. The gas is lighter than both liquids, so it rises to the top, carrying bubbles of the water along with it. When it reaches the surface, the gas escapes, sending the water sinking back to the bottom.

SAFETY TIPS

– Never cap the container while the mixture is active.
– Don’t pour the mixture down the drain, as it can clog pipes

MATERIALS NEEDED

- Tall empty jar or bottle
- Vegetable oil
- Water
- Food coloring
- Alka-Seltzer or similar antacid tablet
- Confetti, optional

PROTOCOL

- ❖ Fill the jar about halfway full with vegetable oil.
- ❖ Add water until the jar is about three-quarters full.
- ❖ Add 5-10 drops of food coloring, swirl the jar gently to mix.
- ❖ Add confetti if using
- ❖ Break an antacid tablet into several pieces and drop into the jar one at time.
- ❖ Watch the lava lamp activate!

ALTERNATE LAVA LAMP METHOD

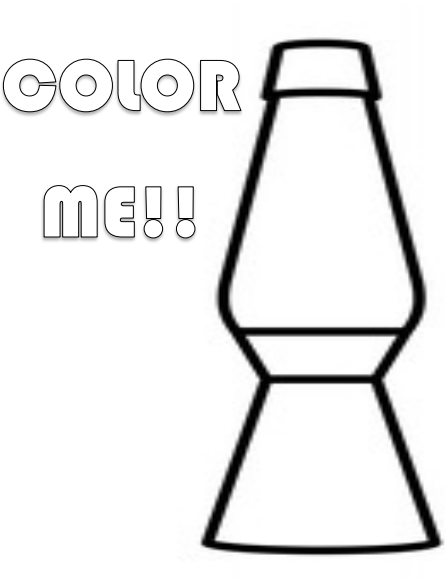
You can also create the same reaction with baking soda and vinegar – no antacid tablets required. This type of lava lamp is more explosive, but short-lived. Try out both!

MATERIALS NEEDED

- Tall empty jar or bottle
- Vegetable oil
- Water
- Food coloring
- Baking soda
- Vinegar
- Confetti, optional

PROTOCOL

- ❖ Put a few tablespoons of baking soda at the bottom of the jar.
- ❖ Add water until the jar is about one-quarter full.
- ❖ Add 5-10 drops of food coloring, swirl the jar gently to mix.
- ❖ Add vegetable oil until the jar is about three-quarters full.
- ❖ Add confetti if using.
- ❖ With the jar on a flat surface, slowly add in vinegar one tablespoon at a time. Add more as needed.
- ❖ Watch the lava lamp activate!



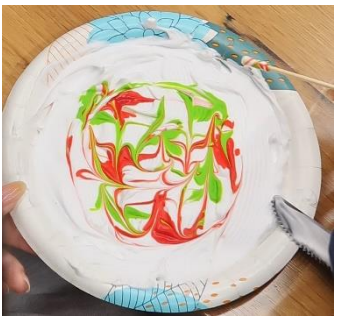
PAPER MARBLING

You can use the properties of various water-loving or water-repelling materials to create beautiful works of art!

Shaving cream is a mixture of soap and water. Soap has both hydrophilic (water-loving) and hydrophobic (water-repelling) parts. Liquid food coloring is a water-based dye (hydrophilic). Food coloring only interacts with the hydrophilic ends of the soap in shaving cream and will not spread much. Paper is composed of cellulose, which is hydrophilic. When laid on top of the shaving cream, the dye easily transfers onto the paper.

MATERIALS NEEDED

- Plate
- Shaving cream
- Liquid food coloring
- Toothpick
- Blank notecard or cardstock
- Wooden craft stick
- Paper towels



PROTOCOL

- Spread shaving cream across the plate with a spoon – it does not need to be thick but should at least fit the size of your card.
- Add drops of food coloring on top of the shaving cream.
- Take the toothpick and swirl it through the colors in the shaving cream to create a pattern – be careful not to overmix!!
- Place the paper card over the plate to cover the design. Gently press it into the shaving cream.
- Remove the paper card, turn it over and lay it flat. Use the wooden craft stick to scrape off the shaving cream from the surface of the card or blot off with a paper towel.

CATALASE ENZYME EXPERIMENT

Enzymes are biochemical machines called catalysts. A catalyst can help start and speed up chemical reactions while keeping its original form. Catalase is a type of enzyme found in almost all living things! Let's explore how this reaction works in the lab using the enzyme Catalase from baker's yeast combined with a substrate.

MATERIALS NEEDED

- Measuring spoons
- Plastic cups
- Marker
- Dawn dish soap
- 3% Hydrogen peroxide
- Baker's yeast
- Warm water
- Food coloring and glitter for extra fun

PROTOCOL

- Prepare yeast according to packet instruction
- Label cups 1 – 4
- To all cups, add 1 teaspoon of dish soap
- To cup #2, add ½ tablespoon of 3% hydrogen peroxide solution. (Use a fresh spoon for the H_2O_2)
- To cup #3, add 1 tablespoon of 3% hydrogen peroxide.
- To cup #4, add 2 tablespoons of 3% hydrogen peroxide.
- Add a drop of food color to all 4 of the cups.
- Starting with cup 1, add 1 tablespoon of the dissolved yeast solution (enzyme) to all the cups and swirl gently.