

**Topic:** Science and Technology

**Badge:** Home Scientist

**Suggested Supplies:** Glass jar, wooden skewer or pencil, string, sugar, food coloring, zip lock bags, balloons, ping pong ball, paper, bubbles, salt and pepper, comb, clear soda, raisins, deep container, lemon and lime, 2 liter bottle of diet soda, Mentos, tape, film roll canister, Alka Seltzer, baking soda, empty soda bottle, vinegar, drinking straws

\* See what is available from the list in your home to see what step may work best for you with what you have on hand.

**Helpful websites:**

Mustard Vinaigrette

Rock Candy

<https://www.allrecipes.com/>

Homemade Ice Cream

<https://www.youtube.com/watch?v=7TiMhu7nDdU>

Science behind homemade ice cream

<https://www.sciencebuddies.org/stem-activities/ice-cream-bag#exploremore>

Giant Bubbles

<https://www.food.com/recipe/giant-bubbles-54559>

Silly Putty

<https://www.wikihow.com/Make-Silly-Putty>

Dinosaur Sn\_t

<https://browniehomescientist.weebly.com/make-dinosaur-snot.html>



**Steps:**

- **Step 1: Be a kitchen chemist-** Start your own experimenting in the coolest place in your house- the kitchen! Science is responsible for making lots of different foods. Try one of these experiments, then enjoy the food when you're done! Choose one to do.
  - o **Make a salad dressing.** Salad dressing is science in action! A vinaigrette is made with two liquids that don't want to blend. They need the help of an "emulsifier" to come together. You can use mustard as your emulsifier to get vinegar and oil to mix into something yummy for your salad. With the help of an adult, look up a recipe for a vinaigrette and make it in your kitchen. Once you're finished, look really closely- your dressing is not a mixture, but actually tiny oil bubbles floating in vinegar, with the help of mustard. It's an emulsion!
  - o **Grow rock candy.** Make your own candy from sugar crystals. Use a hand lens or magnifying glass to look really closely at how the crystals grow. Do they look different than salt crystals?
  - o **Make your own ice cream.** With the help of salt, ice cream stays creamy instead of turning into a block of ice. Salt helps keep the ice cream temperature low enough to freeze milk, and sugar helps keep the ice cream from freezing

solid! There's more cool science in ice cream- with an adult, find out more online.

- **Step 2: Create static electricity-** Ever wonder why your clothes sometimes cling to you? Or why you feel a shock when you touch a doorknob? It's because of static electricity. Try one of these experiments to find out more about how it works.
  - o **Follow the balloon leader.** A balloon charged with static electricity can make a lot of different things follow it around the room! Blow up the balloon and tie the end. Rub it on your hair. Then hold it close to the Ping-Pong ball. When you move the balloon, watch the science magic.
    - What happens? When you rub the balloon against your hair, you give it a negative charge. The balloon takes some of the electrons from your hair, which leaves your hair positively charged.
    - Your positively charged hair is now attracted to the negatively charged balloon, so your hair starts to rise to meet it. This is similar to the Ping-Pong ball, which is drawn to the negatively charged balloon as the area near it becomes positively charged-opposite charges attract.
    - You also see how same charges repel here- after you rub the balloon, the strands of your hair repel each other! Try the experiment again with small bits of paper or blow some bubbles and see if they'll follow the balloon.
  - o **Make pepper dance.** See what happens when electric charges jump back and forth.
    - Pour some salt and pepper on the sheet of paper. Blow up the balloon and tie it, and then rub it on your hair. Hold it over the salt and pepper and watch it "dance."
    - What happens? After you rub the balloon on your hair, it gets a negative charge. When you bring it close to the salt and pepper, the charge attracts the pepper first because it's lighter than salt. The pepper moves to the balloon, where it gets a negative charge, which repels it back to the paper. There, it loses the charge, and the "dance" starts again.
  - o **Bend water.** See if you can bend water with static electricity.
    - Turn the water on in a very thin stream. Rub the comb very quickly on the sweater. Then bring the teeth of the comb near the water, about 3-4 inches below the faucet. Watch closely!
    - What happens? The water bends toward the comb! By rubbing the comb against the sweater, you gave it a positive charge. This caused the water to be attracted to the charged item. Try moving the combs different distances from the water. Then try running it through your hair more times. You could also try different kinds of combs.
- **Step 3: Dive into density-** How come some things float, while others don't? It's all about density. Density is not weight, but it's related. For example, if you swim in the pool with blow-up floaties or a raft, you won't sink because the air inside the floaties is less dense than the water around you. So, the air helps hold you up! Try one of these to find out more about density.
  - o **Egg in saltwater.** See if you can keep an egg suspended in the middle of a glass with this experiment.
    - Mix the salt and one cup of water in the glass, then add a few drops of food coloring. Mix to dissolve the salt. Then slowly pour the remaining

- cups of plain water down the side of the glass. Carefully lower your egg into the glass.
- What happens? The egg should sink until it hits the layer of saltwater. The food coloring is to help you see the boundary between the saltwater and plain water. Why does the egg stop sinking? Because the saltwater is denser than the egg!
  - **Dancing raisins.** Can you make raisins move without touching them? Try this experiment.
    - Pour clear soda into a glass. Drop 6 or 7 raisins into the soda. Watch them for a few seconds.
    - What happens? Raisins are denser than the soda so at first they sink. But then the bubbles from the soda fill the wrinkles in the raisins, lifting them up. When the bubbles reach the top of the glass, they pop, and the raisins sink again.
  - **Lemons vs. Limes.** Lemons and limes seem very alike. But are they really?
    - Fill a deep container with water. Add the lemon or lime.
    - What happens? Usually the lemon will float, and the lime won't. This is because a lime is denser than water, but a lemon is not. Try the experiment again with different juicy fruits. You could use an orange with peel and one without, and then add more fruit with and without peels. Which float and which sink? Are any of them in the middle?
- **Step 4: Make something bubble up-** When mixed with a gas called carbon dioxide, some household items can have a fun reaction. Check out how carbon dioxide reacts with different elements. Choose one to do.
- \*IMPORTANT TIP:** Make sure you wear sunglasses or safety glasses for these experiments!
- **Soda geyser.** A geyser is a hole in the earth that sprays out hot water and steam. So, making your own is definitely an *outside* experiment!
    - Take the top off the soda bottle and set the bottle on the ground somewhere outside with nothing else around. Open the package of Mentos candy, and stick them along a piece of tape so you can drop them all into the soda at once. When you are ready to make the drop, be ready to run and stand back!
    - What happens? A soda geyser will erupt because of the carbon dioxide gas created by the rapid reaction between the candy and soda.
  - **Film-canister rockets.** If a gas like carbon dioxide builds up, it can create a strong force.
    - Fill the film canister half-full with water. Cut the Alka Seltzer tablet into 4 pieces, then drop the pieces into the canister, and snap on the lid. Time the reaction!
    - What happens? The carbon dioxide created by the reaction in the canister should pop the top off the canister. Try again, changing the amount of water or Alka Seltzer. Is there a best combination?
  - **Blow up a balloon without using your breath.** Gases like carbon dioxide will try to find a place to go when they are expanding in confined spaces. Test this out by showing your friends or family how to blow up a balloon without using your breath. Be careful- the balloon might pop!

- Instructions: With one of the spoons, add the vinegar to the bottle. Ask a friend or an adult to hold open the mouth of the balloon, and, using the other spoon, pour baking soda into the balloon. Then stretch the balloon's opening over the mouth of the bottle. Make sure the baking soda inside the balloon falls into the vinegar.
  - What happens? The baking soda and vinegar create carbon dioxide when they mix. There is not enough room inside the bottle for the extra gas, so it expands into the balloon, blowing it up!
- **Step 5: Play with science-** Science can also be used to make things that are just plain fun! Use science to make one of these homemade "toys" and amaze your friends and family!
  - **Giant bubbles.** These are even *more* fun than the small ones from the standard bubble wand.
    - Instructions: To make your bubble blower, cut a long piece of string and thread it through two straws. Tie the end of the string together, and then slide the knot into the middle of one of the straws. You can adjust the blower size by making the length of string shorter or longer before tying ends. Pour the liquids into the tub and mix. Dip your blower into the tub. Holding the straws, slowly spin around. With some practice, you should create huge bubbles.
  - **Homemade Silly Putty.** Silly Putty is fun goo that you can stretch, stamp, and play with. Instead of buying some, why not make your own?
  - **Make dinosaur sn\_t.** Okay, so maybe it isn't real...but it sure looks like it! Use your hands to make sure the mixture has really combined. After about a minute, you'll have stretchy slime that looks like it came from a dinosaur. *Achoo!*

**\*Once completed, this badge can be purchased at the GSUSA Girl Scout shop for \$3.00 plus shipping. This Brownie badge can be found in the Brownie badge section under the STEM category or visit the direct link at: <https://www.girlscoutshop.com/BROWNIE-HOME-SCIENTIST-BADGE>**