

Science in Bags & Bottles



Crackle! Fizz! These projects will show your child how much fun science is—and teach him important science concepts. Everything takes place inside a bag or a bottle, so there's almost no mess. To get started, gather sturdy freezer bags with zipper closures and various sizes of bottles (rinse, and peel off the labels).

Safety Note: All experiments require adult supervision. These projects use safe household items, but remind your child not to eat or drink them.

Lava lamp

Create a homemade version of this “moving” decoration. Your youngster will be delighted with the chemical reaction he sets off, and he'll see how air bubbles act in a liquid.

Materials: 1-liter plastic bottle, funnel, vegetable oil, water, food coloring, 1 Alka-Seltzer tablet

Give your child a funnel to fill $\frac{3}{4}$ of a plastic bottle with vegetable oil and $\frac{1}{4}$ with water, leaving about an inch at the top. Let him squeeze in 10 drops of food coloring. Then, break an Alka-Seltzer tablet into several pieces and drop them in, piece by piece. It's a lava lamp! To keep the lava lamp going, he can add more Alka-Seltzer or screw the lid on tightly and tip the bottle back and forth.

How it works: When the chemicals in the Alka-Seltzer get wet, they react to cause gas bubbles. The food coloring sticks to the bubbles when they rise. When the bubbles pop, the color has nothing to stick to, so it sinks. This happens over and over, causing a moving “lamp.”

Caution: Supervise your youngster when he handles Alka-Seltzer, and store it where he can't reach it.

Pop a bag

Create a mini-explosion in your sink to show your child what chemical reactions can do.

Materials: small zipper bag, warm water, vinegar, baking soda, piece of tissue

Help your youngster scoop 1 tbsp. baking soda onto the center of a tissue and fold it into a little packet. Have him pour $\frac{1}{2}$ cup warm water and 1 cup vinegar into a zipper bag.

He should zip the bag halfway, toss in the baking soda packet, quickly seal the bag, and drop it in the sink. Pop! It will explode.

How it works: Baking soda and vinegar form a gas when combined. When the gas tries to spread out and has no place to go, it stretches the bag until it breaks.

Fireworks display

Your child can make her own fireworks.

Materials: small container, vegetable oil, food coloring, 2-liter bottle, water, funnel

In a small container, have her mix 1 tbsp. vegetable oil with 2 drops each of her favorite food colorings. Stir slightly to break up the colors a little. Then, help her fill a 2-liter bottle almost to the top with water.

Next, let her use a funnel to pour in the



colored oil mixture. She'll see tiny streams of color snake downward—upside-down fireworks!

How it works: Oil rises to the top of the water, while the food coloring drops down.

Homemade ice cream

Turn liquid into a solid—and the result is ice cream.

Materials: 2 1-quart freezer bags, 1-gallon freezer bag, milk, vanilla extract, sugar, ice, salt, winter gloves, bowl

Have your youngster mix $\frac{1}{2}$ cup milk, $\frac{1}{2}$ tsp. vanilla extract, and 1 tbsp. sugar in a quart-sized freezer bag. Double-bag it, squeezing out as much air as possible and sealing both bags tightly.

Then, let him place the bags into a gallon-sized freezer bag and add 4 cups of ice. Sprinkle 4 tbsp. salt on the ice. Seal the large bag, too, making sure the air is pressed out.

Give your child a pair of winter gloves so his hands won't get cold. He should shake and massage the large bag for 5–8 minutes, and then take out the small bag. Scoop the contents into a bowl, and enjoy the vanilla ice cream!

How it works: The salt makes the ice melt into very cold water, causing the milk mixture to freeze into ice cream.

continued



Beach bag

Searching for treasures in the sand is lots of fun, and this activity is the next best thing.

Materials: 1-quart freezer bag, sand, small metal objects, refrigerator magnet

Help your child fill a bag $\frac{3}{4}$ full with sand (or sugar or salt). Together, gather 5–10 small metal objects (paper clip, bobby pin). Your youngster can add them to the sand, seal the bag, and shake it to hide the items.

Then, let her slowly slide a refrigerator magnet over the bag. The metal objects will come out of hiding!

How it works: The magnetic force pulls on the metal objects.

Liquid stripes

Demonstrate the idea of density with this layered project.

Materials: 1- or 2-liter plastic bottle, food coloring, water, vegetable oil, pancake syrup, liquid dish detergent

Let your youngster add 2 drops of food coloring to 2 oz. of water (choose a color that's different from your detergent). Then, have her carefully pour 2 oz. each of vegetable oil, syrup, and detergent and the colored water into a bottle, one at a time. Tell her not to shake the bottle—she'll see the liquids layer themselves!

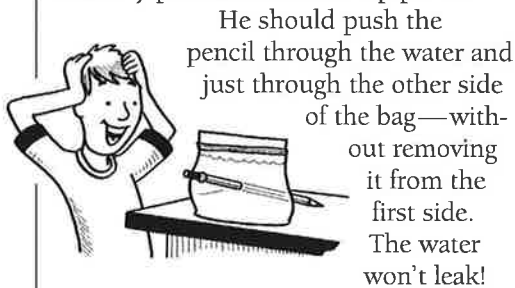
How it works: The denser the liquid, the lower it sinks. So, the densest liquid (syrup) sinks to the bottom. The least dense one (oil) stays on top.

Plastic magic

What happens when you poke a hole in a bag of water? Your youngster can find out with this experiment.

Materials: small zipper bag, water, pencil

Have him hold a zipper bag under the tap until it's $\frac{1}{2}$ full of water and then close the bag. Help him hold it up with one hand and use his other hand to carefully pierce it with a sharp pencil.



He should push the pencil through the water and just through the other side of the bag—without removing it from the first side. The water won't leak!

How it works: Plastic is made of chains of tiny particles called “polymers”—they're what make the bag stretchy. The pencil point slips through the chains without breaking them, and the chains close around the pencil, preventing leaks.

Egg-in-a-bottle

Teach your child about air pressure with this surprising experiment.

Materials: glass bottle (shatter-proof, with opening slightly smaller than an egg), saucepan, egg, water, large spoon, 2 bowls (don't use plastic)

Place an egg and 16 oz. of water in a saucepan. Bring the water to a boil, and

boil for 10 minutes. Take the egg out of the boiling water with a large spoon and put it in a bowl. Pour the hot water into a second bowl. Then, rinse the egg with cold water, and have your youngster peel it when it's cooled.

Let your child carefully place an empty glass bottle in the bowl of hot water. Have him balance the egg, tapered end down, on top of the bottle. Presto! The egg slips into the bottle.

How it works: The hot water heats up the air inside the empty bottle. Hot air expands and pushes out some of the cooler air. Then, the egg is pulled inside the bottle.

River currents

Let your youngster see the patterns in flowing water—and she'll learn about currents in oceans and rivers.

Materials: 2-liter plastic bottle, “pearlized” liquid hand soap (contains glycol stearate), blue food coloring, funnel, water

Have your child pour the soap into a bottle $\frac{1}{4}$ of the way and add 3 drops of blue food coloring. Using a funnel and slightly tilting the bottle, help her slowly fill the bottle with water, being careful not to create suds. Put the lid on, and have her gently tip the bottle upside down several times, letting the soap sink to the bottom each time.

Currents will flow through the bottle. Your youngster can move it to make patterns—she might spin it quickly, twirl it slowly, or hold it horizontally and tip it up and down like a seesaw.

How it works: The glycol stearate in the soap (the chemical that makes it look shimmery) lets you see the patterns water makes when it flows.



Be a Backyard Scientist!



Wonders await your child in the outdoors, from the clouds above to the worms below. Head to your backyard or a park for some science adventures, and get ready to observe, experiment, and explore together.

Plants and trees

Plant needs

Show your child how light affects plants. This project will also teach her to set up a simple science experiment.

Cut the tops off two milk cartons. Let your youngster fill them $\frac{3}{4}$ of the way with soil. Plant four bean seeds in each carton, and cover with just enough soil to completely cover them. Water just enough to moisten the dirt. Have her put one planter in a sunny spot (in the yard, on a windowsill) and another in a shady spot outdoors or indoors.

Then, help her create a two-column chart to measure the seeds' growth. On a small poster board, she can draw a seed in each column and a ruler next to each. Help her use a real ruler to mark inches on her picture. First, check each day to see which pot's seeds sprout first. Then, every few days, have her measure her plants, record their height on the chart, and draw any changes she sees (stem, leaves). Help her compare the ones that received sunlight with the ones that didn't.

Why did the plants in the sun grow taller? You can explain that plants use sunlight to make food. And they need food to grow, just as your youngster does.

Tree diagram

Ask your child to choose his favorite tree in your yard or the park. Give him paper and crayons to draw it, and help him label the roots, trunk, and leaves.

As he sketches, point out the role of each part. Show him the roots poking



through the ground and explain that the roots of a tree soak up water and store food. Compare the trunk to a straw that carries the water to the branches and leaves, just like your youngster sucks through a straw to get juice into his mouth. He can learn about bark by adding a bark rubbing to his drawing. Have him press his paper to the trunk and lightly rub with the side of a brown crayon. The rough texture of the bark will appear on the paper.

Finally, talk about how leaves come in all shapes and sizes. Let your child know that leaves help make food for the tree, and they also give us shade.

Evergreen or not?

Deciduous trees (maple, elm) lose their leaves in the winter, and *evergreens* (pine, spruce) keep them. This experiment shows your youngster why.

Some evergreens, like pines and firs, have sharp leaves called *needles*. (Be careful not to touch their tips!) Others, like magnolias, have wide ones. But no matter what the shape, all evergreen leaves have something in common: a waxy, waterproof coating.

To see how the coating works, ask your child to cut two leaf shapes from green paper and spray them with water until they're slightly damp. Have him tape wax paper around one and leave the other bare. Lay them in the sun for a couple of hours. What happens? (The bare paper leaf dries out, but the protected one stays wet.)

In winter, there's less water in the ground for trees to "drink." The deciduous leaves dry out and fall to the ground. But the waterproof coat on evergreen leaves keeps the water inside so they stay green.



continued

Sun and clouds

Shadow science

Has your youngster ever noticed that the sun seems to move across the sky throughout the day? Experimenting with shadows can help him begin to understand the Earth's rotation.

Go outside on a sunny day and show him how your body makes a shadow. Have him use chalk to outline your shadow on the ground. Come back every two or three hours during the day and have him outline it again. Each time, the shadows will be in a different spot and will be a different shape.

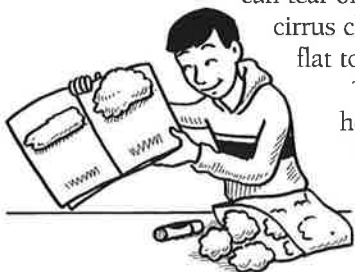
Explain that the Earth turns around constantly, which means the sun shines on different parts of our planet throughout the day. That's why our shadows look different at different times. Encourage your youngster to look for more shadows—his own, as well as those of trees, swings, bikes, and houses.

Cloud journal

Find different kinds of clouds, and let your child make a journal that will bring them down to Earth!

First, scan the sky together for clouds that are big and puffy (*cumulus*), high and wispy (*cirrus*), and low and layered (*stratus*). Then, staple together four sheets of blue construction paper. On the front, help your youngster write, "My Cloud Journal."

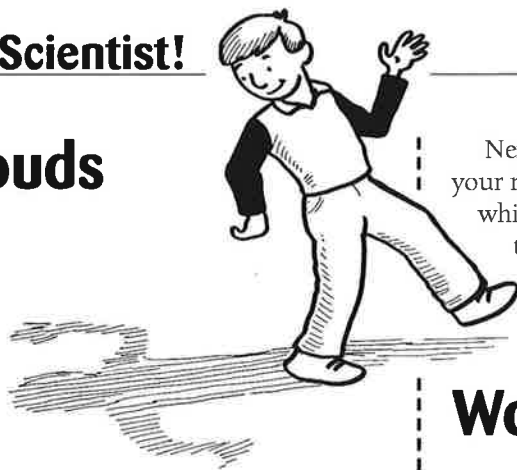
Give him cotton balls and glue and have him create and label a different type of cloud on each page. For example, he can tear off thin pieces of cotton to make cirrus clouds and stretch cotton balls flat to make stratus clouds.



Tell your child that clouds help us predict weather. Cumulus and cirrus clouds usually mean dry days, while stratus clouds are heavy with water and often bring rain or snow.

Cloud race

Make "racetracks" to show your youngster that clouds move through the sky. Help him carefully cut around an empty cereal box so he has two cardboard rings.



Next, each of you can lie back and choose a cloud. Hold your racetrack at arm's length, count to three, and stay still while your cloud passes through the ring. The first cloud to cross a racetrack wins.

Explain that wind blows the clouds along. Even if it's not a windy day, the air high in the sky is always moving.

Worms and ants

Dirt tunnels

Your child can make a worm habitat to watch how worms make tunnels in soil.

Use a knife to poke several holes in the lid of a large, clear plastic container. Let your child put one inch of soil in the bottom, sprinkle a thin layer of uncooked oatmeal on top, and add one inch of sand. She can alternate soil, oatmeal, and sand until she reaches the top of the dish. Have her water the mixture just enough to dampen the soil.

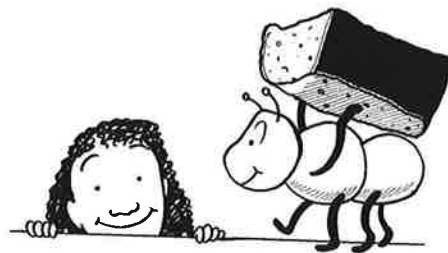
Then, help her find an area of your yard with worms and dig up about a dozen to put in her habitat. In a few days, your youngster will see a network of tunnels through the sides of the container.

Earthworms eat their way through soil, making tunnels as they go. The tunnels allow plenty of water and air to get into the soil, which helps plants grow.

Note: After looking at the tunnels, help your youngster return the worms to their home.

All about ants

Find an anthill in your yard or at the park. Watch ants move in and out. Your child will see worker ants carry in food. Sometimes a crumb is so big that it takes more than one ant to move it.



Crumble a cereal flake near the ants. Your youngster will enjoy watching them work together as a team to get the food into the ant colony.

Then, lay a piece of white paper on the ground and let one or two ants crawl onto it. Lift up the sheet and have your child look at the insects through a magnifying glass. She'll see three parts of the body (head, thorax, abdomen), antennae, and six legs. Some queen ants and all males have wings. Put the paper on the ground when you finish so the ants can return home.