



CREATIVE CHEMISTRY

EVER WONDER... where rubber comes from?

What We Did Today: Invent a Bouncy Ball Formula

Materials: Water, Borax (a laundry detergent you can find at a grocery store), glue & food coloring.

Directions:

- ◆ Mix $\frac{1}{2}$ cup of water with 1 teaspoon of Borax. Mix thoroughly (until the Borax is dissolved).
- ◆ In another cup, mix $\frac{1}{4}$ cup of glue and 8 drops of food coloring. It's now time to start creating your bouncy ball!
- ◆ Start mixing the cup of Borax and water with a spoon. **Slowly** start pouring the glue into the Borax & water solution while you continue stirring. The glue will start to wrap around the spoon.
- ◆ Continue pouring all the glue into the water & Borax solution. Keep stirring for about 2 more minutes.
- ◆ Pull the glue off the spoon and dry it off using a paper towel. Make sure your hands are dry as well.
- ◆ Shape the new mixture into a ball by rolling it between your hands.
- ◆ Voila! You have created your own Bouncy Ball!

Extension: Can you make your bouncy ball have more bounce? Try varying the ingredients (e.g., use more/less Borax, use more/less water, use more/less glue).

Amazing Inventor: Charles Goodyear & The Weird Way He Invented Rubber



Charles Goodyear was a scientist and inventor who lived almost 200 years ago. He saw that things made out of old-fashioned rubber -- such as shoes and water hoses -- would get hard as a rock when it was cold outside, and melt into goo when it was hot. This was a big problem! So Mr. Goodyear began to think about ways to fix the problem. He did not know very much about chemistry, and he did not have any money to build a fancy laboratory or buy special equipment. Also, many people told him that he could not solve the problem. But he worked really hard for many years, and kept working on the problem even when he was having trouble earning enough money to feed his family. He was determined! He studied and studied, using many different experiments to see what would happen to the rubber when he mixed in different ingredients. Then one day, a really weird thing happened! He walked into a store to show his friends

his newest mixture, and they all laughed at him because they did not believe he could solve the problem. This made him really mad, and when he waved his hands to make them stop laughing, some of the rubber flew right off his hand and into a sizzling hot pot-belly stove. When he finally got his experiment back out of the fire, he thought it was ruined! It looked black and burned and awful. But then he noticed something amazing -- all around the blackened, most burned part was a ring that was brown and springy and did not melt in the fire or get hard in the cold air outside the stove – exactly what he had been trying to invent! Eureka! Through working hard, thinking creatively, and recognizing that even a mistake can solve a problem, Charles Goodyear invented the improved rubber that we use today! Thank goodness he tried so many experiments – because without his creative thinking and hard work, we might not have tires for our bikes or boots to keep our feet dry or basketballs to play with or rubber bands to put in our hair!

Did You Know?

- ◆ Rubber comes mainly from a tree found in the Amazon rainforest called the Hevea. To gather the liquid, workers slice off a strip of bark diagonally, and let the liquid drain into a cup.
- ◆ The word “rubber” was made up 200 years ago by a British scientist who discovered that a bouncy ball could “rub” away pencil marks. (Try this yourself and see!)
- ◆ Rubber is made up of long chains of things called "polymers." These chains are like tiny, twisted strands of cold spaghetti. When a rubber band is stretched, the chains uncoil and straighten. When the rubber band is released, the chains coil up again. This is what makes rubber things stretchy and bouncy.

Creativity at Home

- ◆ Rubber is often found in things that are stretchy or waterproof. This week, walk around your house and try to find things that are made out of rubber. Here are some examples:

Rubber band	Bicycle tire	Boots	Bouncy ball
Garbage bag	Rain coat	Eraser	Rubber duckie

Try to imagine what these things would be like if they were suddenly as hard as a rock, or melted in your hand like goo!

- ◆ Pretend like your body is all of a sudden made of rubber! How do your arms move? How do your legs move? What will your neck do? How about your belly?
- ◆ Make a pretty bracelet by making a chain with different colored rubber bands. How big does it need to be before you can stretch it over your hand?
- ◆ Take three rubber things – like a rubber band, a piece of a garbage bag, and a rubber duckie – and see how far they stretch. Why do you think some things stretch farther than others?
- ◆ Use the word rubber in a sentence. How many different sentences can you make? What does rubber rhyme with? Can you make up any silly rhymes or songs about stretchy, bouncy things?