



**CURIOSITY ZONE™**  
• EVER WONDER? •

# WONDER WIRE™

January 2005

ideas to inspire curious children

Vol. 2 No. 1

## EVER WONDER . . . HOW QUICKSAND WORKS?

**EXPLORE.** How can you tell if something is a solid or a liquid? The main difference between solids and liquids is that solids hold their shape while liquids assume the shape of whatever container they're placed in. For example, a grape will stay the same shape if you drop it in a glass -- so it's a solid. Grape juice, on the other hand, will assume the shape of the glass -- so it's a liquid. But some things act like both a liquid and a solid. For example, ketchup will pour out of its container like a liquid, but only if you apply pressure; quicksand looks like a liquid, but when you apply pressure to it, it becomes hard as a rock! And some solids act funny by changing shape temporarily -- like when you stretch a rubber band or bounce a ball. Look around your house this month and find as many solids and liquids as you can!

**DISCOVER.** **Oobleck Experiment (10 mins.)** Oobleck behaves just like quicksand -- it flows like a liquid until you apply pressure to it -- then it becomes hard as a rock! Ingredients: cornstarch, water, food coloring (optional).

- ◆ Use a plastic spoon to mix about 1 cup of water with 2-3 drops of food coloring in a plastic glass.
- ◆ Add about 1 cup of cornstarch to the water and stir until well mixed. Keep adding by spoonfuls until the mixture is very hard to stir.
- ◆ Pour your oobleck into a shallow disposable container.



Does your oobleck assume the shape of the container you pour it into, or does it stay in a blob? What happens when you try to run your hands through it? Or try to pick up a hand full? Does it feel like a liquid or a solid when you squeeze it? Try cutting it in the container with a plastic knife. Run your finger through it quickly and slowly. Try to stir in some food coloring. How does the oobleck behave?

**Bouncy Blubber Experiment (10 mins.)** Turn a liquid into a solid in this fun experiment! Ingredients: borax (found in the laundry aisle), washable school glue, water, food coloring (optional).



- ◆ Fill a plastic cup about halfway with water (about 1/2 cup). Add 1 teaspoon of borax and mix with a plastic spoon until the Borax is dissolved.
- ◆ In another cup, mix about 1/4 cup of glue and 8 drops of food coloring with a plastic spoon. It's now time to start creating your bouncy ball!
- ◆ Stir the borax solution with a spoon while you slowly pour in the colored glue. The glue will start to wrap around the spoon.
- ◆ Continue pouring until all the glue has been added and twisted around the spoon. Keep stirring for about 2 more minutes.
- ◆ Pull the colored glob off the spoon and dab it dry with a paper towel.
- ◆ With dry hands, shape the new mixture into a ball by rolling it between your hands. Voila! You have created your own bouncy ball!

What do you think made the liquid glue turn into a solid? Bounce your ball on a hard surface. What do you think makes the solid bounce? Can you make your bouncy ball have more bounce? Try varying the ingredients (e.g., more/less borax, more/less water, more/less glue).

### C-ZONE NEWS

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**WORD OF THE MONTH: FLUID. USE IT IN A SENTENCE AT LEAST ONCE A DAY!****SIR ISAAC NEWTON**

Sir Isaac Newton is one of the greatest scientists who ever lived. His work has had a huge impact on mathematics, astronomy and physics. He invented the first reflecting telescope

(which led to the modern telescopes we use today to see deep into space); he invented the branch of math called “calculus” (which is now used throughout science, and which you will learn in high school and college); he discovered the three laws of motion; and he developed the universal law of gravitation. Although Isaac Newton was not a very good student when he was young, he was very creative and loved to learn and invent new things. For example, he built a windmill powered by a mouse that could run even when the wind wasn’t blowing. He also invented a paper kite that could lift a small lantern into the night sky to create light. One of his most important discoveries came when he noticed an apple falling out of a tree. He wondered why the apple fell to the ground while the moon still remained in the sky. In working to solve this problem, he discovered the law of gravity!

**SECRET SCIENCE AGENTS:  
JANUARY MISSION**

Find at least five things around your house that can be changed from a solid to a liquid, or a liquid to a solid. For example, water can change from a solid (ice cube) to a liquid (runny water). What does it take to make the matter change form? Pressure? Heat? Cold? Something else?

**LEARN**

- ◆ Back in the 1700s, Sir Isaac Newton identified the properties of a normal liquid. Water and other liquids that have the properties Newton identified are called “Newtonian fluids.” Liquids that don’t show the properties identified by Newton are called “Non-Newtonian fluids.”



- ◆ A Non-Newtonian fluid is a liquid that changes when it is stirred or squeezed. It can be smushed into a blob that acts like a solid, or poured out of a cup like a liquid – just like your oobleck!

- ◆ Quicksand is a Non-Newtonian fluid. If you ever get stuck in quicksand, try swimming toward solid ground very slowly. The slower you move, the less the quicksand will resist your movement.



- ◆ Non-Newtonian fluids do not follow the “law of viscosity.” Viscosity is how thick or runny a liquid is, and the law is that it usually doesn’t change. But when you squeeze a handful of oobleck, its viscosity does change, so that it acts like a solid for a moment. Toothpaste is also a non-Newtonian fluid, though unlike oobleck, toothpaste acts like a solid -- it doesn’t come running out until you press on it –then it acts like a liquid!



- ◆ Bouncy things are made up of long chains of “p” rubber band, when polymers are stretched, they uncoil and straighten. When they are released, the chains coil up again. A chemical reaction between the glue and the borax solution created the polymers that made your ball bouncy!



- ◆ 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 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.

**COMING IN JANUARY: EVER WONDER HOW QUICKSAND WORKS?**

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