



Bouncy Ball

How high can you make your ball bounce?! Channel your inner chemist as you combine ingredients and learn about polymers to create a fun, bouncing toy.

TEKS:

SCI 3.5 D: The student is expected to explore and recognize that a mixture is created when two materials are combined such as gravel and sand or metal and plastic paperclips.

SCI 5.5 B: The student is expected to demonstrate that some mixtures maintain physical properties of their ingredients such as iron filings and sand and water.

SCI 5.5 C: The student is expected to identify changes that can occur in the physical properties of the ingredients of solutions such as dissolving salt in water or adding lemon juice to water.

Materials:

- Borax (1 tablespoon)
- 2 bowls
- Cornstarch (1 tablespoon)
- Disposable rubber gloves (optional)
- Food coloring
- Fork
- Warm water (1/2 cup)
- White liquid glue (2 tablespoons)

How To:

1. In the first bowl, mix the warm water and Borax.
2. In the second bowl, mix the white liquid glue, cornstarch, and 3-5 drops of food coloring.
3. Pour the white liquid glue, cornstarch, and food coloring mixture from the second bowl into the first bowl. Do not stir this mixture.
4. Let this mixture sit for about 10 minutes, or until the glue and cornstarch mixture has hardened.
5. Optional: put on disposable rubber gloves.
6. Use a fork to remove the hardened glue mixture from the bowl. If the mixture is too sticky to handle, put it back into the water and Borax mixture until it hardens.

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7. Use your hands to roll the glue mixture into a ball. This can get messy! You may have to roll it around a lot in your hands before it's able to bounce.
8. Test your homemade bouncy ball!

Bonus challenge: Create different bouncy balls!

- What happens if you use different proportions of ingredients, such as more/less Borax or more/less cornstarch? Do you think using a different kind of glue would make a different bouncy ball? How does the mixture change if you use ice-cold water instead of warm water?

STEM Explanation:

A "monomer" is a single molecule that can be connected to other molecules. A "polymer" is a long chain of monomers. Adding "poly-" in front of a monomer tells scientists that lots of large molecules that are the same have been linked together. Polymers can be found in plastics, ranging from milk jugs to phone cases to reinforced plastics used on airplanes.

The bouncy ball you just made is also created with polymers! The main ingredient in liquid glue is the polymer polyvinyl acetate, or PVAc for short. This is what allows the glue to slide right out of the bottle and across a page. When Borax is added to the polymer glue, it creates a part liquid, part solid substance. This substance can move on its own, but it is less liquid than the glue. This is because the Borax ties the large molecules together, leaving a substance that does not flow as easily as glue alone. When molecules are tied together, scientists call this "cross-linking." Once the cornstarch is added, the chain-linked molecules are cross-linked even tighter, and you're left with a substance that can be shaped into a bouncy ball.

Career Connection:

Chemists study the properties of matter. They may specialize in a specific area of chemistry, such as organic chemistry or physical chemistry. These scientists must understand the structure, properties, and compositions of various substances. They study the dynamics of systems and processes at a molecular level.

Resources:

<https://www.the36thavenue.com/how-to-make-a-bouncy-ball/>

http://imaginethat.org/stories/stem-experiment-make-your-own-bouncy-balls/?nab=1&utm_referrer=https%3A%2F%2Fwww.google.com%2F

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