



Physical Change = A usually reversible change in the physical properties of a substance. The substances chemical properties, however, remain the same. A new substance is also created.

Chemical Change = A usually non-reversible change in which the chemical structure of the substance changes to create an entirely new substance.

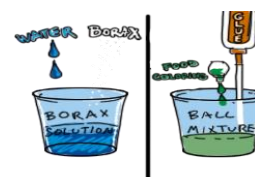
This activity will have you look at physical and chemical changes by creating your own bouncy balls.

YOU WILL NEED:

- At least ½ teaspoon of Borax (found in laundry section)
- At least 1 tablespoon of corn starch
- 2 small mixing cups
- A plastic spoon or other small mixing utensil
- 3-4 drops of food coloring
- 120 ml (4 oz) of warm water
- At least 1 tablespoon of Elmer's Glue
- Rubber or nitrile gloves (optional)

How to Make Your Bouncy Balls

1. Label one cup 'Borax Solution' and the other cut 'Ball Mixture.'
2. Pour 120 ml (4 oz) of warm water into the 'Borax Solution' cup as well as 1 teaspoon of the Borax powder. Stir the mixture so that the Borax dissolves.
3. Pour 1 tablespoon of Elmer's Glue into the cup labeled 'Ball Mixture.' Add 3-4 drops of food coloring.
 - When you add the food coloring, is that a physical or chemical change? Why? Take a look back at the definitions of physical/chemical changes and you can also do some research of your own, if you like on any search engine (www.google.com) for more specific answers, if you like.



4. Add $\frac{1}{2}$ teaspoon of the 'Borax' Solution (**ONLY ADD $\frac{1}{2}$ TEASPOON! The rest can be used to make more bouncy balls later**) you made and 1 tablespoon of cornstarch to the glue. Do not stir yet.
5. Allow the ingredients to sit for about 10-15 seconds and then stir them together to fully mix.



When you begin stirring the mixture, it will start out as a slimy, watery mixture that will slowly harden and become impossible to stir. Is this a physical or chemical change? How do you know? Take a look back at the definitions of physical/chemical changes and you can also do some research of your own, if you like on any search engine



(www.google.com) for more specific answers, if you like.

6. Once the mixture becomes impossible to stir, take it out of the cup and start to shape it with your hands (wear gloves if you have them) into a ball. As you shape it with your hands, the ball, which will start out as a sticky mess, will further solidify. Continue to shape it until it is smooth and round.
7. At this point, you can begin to bounce it. Store your bouncy ball in a sealed bag once you are done playing with it.
8. Wash your hands with soap well after this.
9. Create additional "Ball mixture" to combine with your leftover "Borax mix" to create even more bouncy balls.

Further Observations and Experimentation

1. Here are some different observations that you can make and record on a separate sheet of paper.
 - a. What is the diameter of your finished bouncy ball?
 - b. What is the circumference of your bouncy ball?
 - c. How long did it take the material to solidify into a bouncy ball?
 - d. How high can you get your bouncy ball to bounce? Measure the height.
2. Experiment between the amounts of glue, cornstarch, and borax. How does adding more or less of one of (or more than one) these ingredient(s) effect a newly created bouncy ball?