

Changing States: Does it Matter?

Substances change around us all the time. Substances can undergo physical or chemical changes. It all depends upon the chemical make-up and what is done to the substance.



Physical Changes

A change that does not result in the production of a new substance. Physical changes only alter the form (i.e., solid, liquid, gas) or appearance (i.e., size and shape) of the substance. They are **reversible**.



Examples: water boiling, ice melting, water freezing, change in size, change in shape, change in form

Chemical Changes

A change that results in the formation of a new substance. Chemical changes are **irreversible**.

Possible Indicators of a Chemical Change:

- 1.) color change, 2.) gas given off, 3.) a new substance forms,
4.) heat is given off, 5.) heat is absorbed



Volcanic Eruption



How many of you have seen volcanoes explode at science fairs? Do you know how it works? Can you tell what type of reaction it is, physical or chemical? Let's take a look!

1. Place an empty water bottle in a pie plate
2. Add ½ cup colored water to bottle
3. Add 3 teaspoons of baking soda to water
4. Put lid on and shake bottle
5. Add a squirt of liquid detergent
6. Slowly add 3 tablespoons vinegar to water (this should make it overflow... if you do not want it to overflow then use 2 teaspoons baking soda and 2 tablespoons vinegar)
7. Pour overflow into container and dry out with a towel



A. What did you observe in the eruption?

B. Is the volcanic eruption a chemical or physical change? _____

Practice ~ Identify each of the following as a Physical (P) or Chemical (C) Change.

- | | | | |
|--------------------------------------|-------|---------------------------------------|-------|
| 1. A piece of wood burns to form ash | _____ | 2. Water is absorbed by a paper towel | _____ |
| 3. A piece of cork is cut in half | _____ | 4. A bicycle chain rusts | _____ |
| 5. Turning brownie mix into brownies | _____ | 6. A Popsicle melts | _____ |



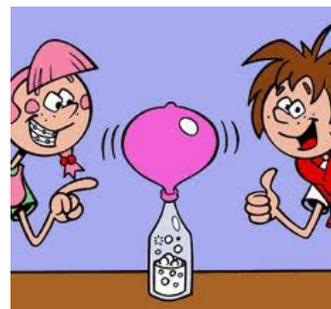
Kitchen Chemistry

Chemistry as we know it began in the 1600s. However, in prehistoric times people believed nature and changes in nature were caused by spirits and magic. Soon after, early man discovered fire and heat and how it could change things. Early scientists (called alchemists) discovered compounds and believed that metal could be turned into gold. However, none of them knew how well chemistry really worked.

Chemists today use expensive equipment and harmful chemicals, but you do not have to! You can become a chemist in your own kitchen. So, grab your lab coat and get ready to do some kitchen chemistry.

Balloon Blow Up

1. Pour $\frac{1}{2}$ cup vinegar into a water bottle.
2. Use a funnel to put $\frac{1}{4}$ cup baking soda in a balloon.
3. Stretch balloon over water bottle containing the vinegar.
Try not to spill any of the baking soda as you attach the balloon.
4. Transfer the baking soda into the bottle.
5. Watch as the balloon expands.



What happened in this experiment? The baking soda and vinegar react, and one of the products of the chemical reaction is carbon dioxide gas. The reaction of baking soda to form carbon dioxide gas is the basis of its use as a leavening (rising) agent in baking.

Cleaning Dirty Pennies

1. Mix 1 tablespoon vinegar and $\frac{1}{4}$ teaspoon salt together in a bowl.
2. Dip 1 penny halfway into the mixture and hold for 10 seconds.
3. Pull the penny out of the solution and see how shiny it is.



Wow! How did that happen? After a while, pennies will oxidize or become dull and dark. This is because of the water and oxygen molecules that they come into contact with in the air. When vinegar is combined with salt it becomes a weak solution of hydrochloric acid. Hydrochloric acid cleans metals like copper. This is a form of chemical change.