

Chemistry Matters Day 1: Oobleck

Materials:

Cornstarch	2 cups
Water	1 cup
Food Coloring or Watercolor	1 -2 drops
Mixing Bowl	1
Stirring Utensil	1
Empty Container or Plastic Bag	1 - 2
Measuring Cup	1 set

Video Link: <https://youtu.be/SfvdAP6tXgg>
<https://youtu.be/tmCGeLtNkwQ>

Background:

- Chemistry is the branch of science that deals with the identification of the substances of which matter is composed; the investigation of their properties and the ways in which they interact, combine, and change; and the use of these processes to form new substances.
- Law of Conservation of Mass: mass can neither be created nor destroyed, although it may be rearranged in space, or the entities associated with it may be changed in form.
- The Three States of Matter.
 - Solid – Atoms are tightly packed together. As substances cool, they tend to lose energy and become denser. They have a definite volume and shape.
 - Liquid – Atoms are arranged with some space between each other, so they are able to flow over each other. As heat increases, their ability to flow tends to as well. They have a definite volume, but indefinite shape.
 - Gas – Atoms are spaced far apart from each other and contain the most energy, as they vibrate and move in whatever container they are placed. They have indefinite volume and shape.
- Viscosity – Measure of a fluid's resistance to flow. A high viscosity fluid flows less readily than a low viscosity fluid.
- Oobleck is a suspension of starch in water. It exhibits the property that when subjected to stress, its apparent viscosity increases.

Vocabulary:

Atoms	the smallest unit of ordinary matter that makes up a chemical element.
Suspension	a mixture of solids in a liquid that is capable of sedimenting out, settling to the bottom.

Preparation:

Set up your work space on a surface that is easy to clean.

Instructions:

1. Gather all of your materials. You may use tapioca or arrowroot powder or potato starch in place of corn starch if needed.
2. Measure out two cups of starch, which is a solid. Put a few drops of coloring or paint in the starch.
3. Slowly pour your cup of liquid (water) in.
4. Slowly stir your mixture together until it's all the same color, and you don't see huge clumps. If it looks dry and crumbly still, put a spoonful of water in.
5. Investigate the substance you have created.
 - Is the substance a liquid or a solid?
 - Hold the Oobleck gently. It will act like a liquid and drip through your fingers.
 - Pick it up and squeeze the Oobleck. Roll it into a ball. It will act like a solid as long as you are putting pressure on the Oobleck.
 - Try punching your mixture. What happens?
 - Slowly run your fingers through the Oobleck. What happens?

Evaluation:

- What do we call the tiny pieces of matter that make up everything?
- Can you name the three states of matter?
- What did we call substances look like one state of matter, but act like another one when you add force?

Further Exploration:

Visit...

- https://melscience.com/US-en/?gclid=CjwKCAjwqpP2BRBTEiwAfpiD-ykvAGNIImc8U6XPAokqQ1pPkqeF43cPng6VItsHhCIEBtQEbkI3LQRoC_rUvD_BwE#see-experiments to watch how-to chemistry videos that you can do at home.

Read...

- [What is the World Made Of? All About Solids, Liquids, and Gases,](#) written by Kathleen Weidner Zoehfeld and illustrated by Paul Meisel



Chemistry Matters Day 2: Inflation Science



Materials:

Baking Soda	2 Tablespoons
Vinegar or Citrus Juice	1 cup
Plastic Bottle	1
Small Plastic Zipper Bag	1
Balloon	1
Tissue or Paper Towel	1
Funnel or Paper Cone	1

Video Link: <https://youtu.be/yIF2uv1w6f0>

Background:

- Chemistry is the branch of science that deals with the identification of the substances of which matter is composed; the investigation of their properties and the ways in which they interact, combine, and change; and the use of these processes to form new substances.
- pH Scale measures acidity or alkalinity (basic) of a substance. The scale runs from 1 to 14, with pure water measured as a 7, or neutral. The closer to 1, the stronger the acid. The closer to 14, the stronger the base.
- In an exothermic reaction, net energy is released to the surroundings as either light or heat. That is, the energy needed to initiate the reaction is less than the energy released.
- An endothermic reaction requires energy to complete and absorbs heat from its surroundings. The energy needed to initiate the reaction is greater than energy absorbed.

Vocabulary:

Inflation	the act of filling an expandable structure with air or gas so that it becomes distended.
Neutralization	reaction between an acid and base, resulting in water and a salt being produced.

Preparation:

Set up your work space on a surface that is easy to clean.

Instructions:

Activity 1: Baggie Pop

1. Place a tablespoon of baking soda on a piece of open tissue paper or a paper towel. Wrap the tissue around the baking soda and set it aside.
2. Open your baggie and carefully pour 1/2 cup of vinegar inside.
3. This next step you will want to do quickly. Drop your tissue of baking powder in the baggie, zip it tight, shake twice, then set it down!

Activity 2: Balloon Inflation

1. Pour one tablespoon of baking soda into the balloon using the funnel.
2. Use the funnel to pour a half cup of your vinegar into the bottle.
3. Stretch the balloon over the mouth of your bottle. Ask for help if needed.
4. Hold the bottle in one hand and the balloon in the other. Shake the baking soda down into your vinegar.
 - This is an example of an acid/base reaction and an endothermic reaction.
 - This is also an example of a physical and a chemical reaction.
 - Mixing the vinegar and baking soda was a chemical reaction because the combination of the two substances created carbon dioxide. This is what created the bubbles.
 - The carbon dioxide also caused the balloon to expand. It changed in size, but is still a balloon, demonstrating a physical change.

Evaluation:

- This is an example of an acid/base reaction and an endothermic reaction.
- This is also an example of a physical and a chemical reaction.
 - Mixing the vinegar and baking soda was a chemical reaction because the combination of the two substances created carbon dioxide. This is what created the bubbles.
 - The carbon dioxide also caused the balloon to expand. It changed in size, but is still a balloon, demonstrating a physical change.

Further Exploration:

Visit...

- <https://www.khanacademy.org/science/chemistry> to find lesson plans and videos all about chemistry!

Read...

- [Change it! Solids, Liquids, Gases and You](#), written by Adrienne Mason and illustrated by Claudia Dávila



Chemistry Matters Day 3: Dancing Popcorn



Materials:

Water	1+ cup
Water Bottle (top cut off)	1
Popcorn Kernels	10+
Baking Soda	1 Tablespoon
Vinegar	1/4 cup
Plate or Tray	1
Spoon or Stir Stick	1

Video Link: <https://youtu.be/Y4Zxa2jazMk>

Background:

- **Nucleation** is when molecules gather together to change phases, like from a liquid to a gas. This happens at spots called “**nucleation site**”.

Vocabulary:

Carbon Dioxide | a colorless, odorless gas produced by burning carbon and organic compounds and by respiration. It is naturally present in air (about 0.03 percent) and is absorbed by plants in photosynthesis.

Nucleation | the first step in the formation of either a new thermodynamic phase or a new structure via self-assembly or self organization

Nucleation Site | an impurity or irregular point in the system, to which nucleation is sensitive

Preparation:

Conduct your experiment on a tray or plate to minimize mess.

Instructions:

1. Pour 1^{1/3} cup of water into your water bottle that has the top cut off.
2. Pour the baking soda into the water bottle, stirring until the baking soda is completely dissolved.
3. Add the popcorn kernels to the bottle.
4. Slowly pour the vinegar into the bottle. You should start to see the chemical reaction taking place.
5. Once all of the vinegar has been added, mix the water gently. Allow the water to rest and observe what happens to the popcorn.
 - Carbon dioxide bubbles surround the popcorn kernels, lifting them to the top of the solution.
 - As the bubbles pop, the popcorn is no longer lifted, and floats back down to the bottom.

Evaluation:

- What happened to the popcorn?
- What did you observe when you added the vinegar to the baking soda?

Further Exploration:

Visit...

- <https://www.mtu.edu/mindtrekkers/demonstrations/> for science demonstrations and lesson plans that you can complete at home.

Read...

- [Amazing \(Mostly\) Edible Science: A Family Guide to Fun Experiments in the Kitchen](#), by Andrew Schloss



Chemistry Matters Day 4: Shiny Science



Materials:

Dull or Dirty Pennies	5+
Cups	2
Vinegar	1 cup
Liquid Soap	1 Tablespoon
Salt	1 teaspoon
Spoon or Stir Stick	1
Paper Towels	

Video Link: <https://youtu.be/Tevf5TyS6m8>

Background:

- Pennies that are dirty often have something on them called copper oxide:
- Copper oxide is created on a penny when the copper penny is exposed to the air for long periods of time.

Vocabulary:

Oxygen	a colorless, odorless gas; humans breathe in oxygen and breathe out carbon dioxide.
Acetic Acid	a colorless, liquid organic compound found in vinegar.

Preparation:

Place a paper towel on your work area to minimize messes.

Instructions:

1. Fill one cup with dish soap and water.
2. Fill your other cup with 1 cup of vinegar and add 1 teaspoon of salt. Stir until completely dissolved.
3. Put one penny into the cup with vinegar and salt. Stir this around for about ten minutes before removing it.
4. Put another penny into the water and soap cup. Stir it around for about 10 minutes before removing it.
5. Remove each of the pennies and observe the results. Note the differences in the pennies after they have been in the different solutions.

Evaluation:

- Which penny was shinier after you cleaned it? Why?

Further Exploration:

Visit...

- https://www.nsf.gov/news/mmg/?series_name=Chemistry%20Now to watch scientists from the National Science Foundation explain how chemistry is in every-day experiences.

Read...

- [Real Chemistry Experiments: 40 Exciting STEAM Activities for Kids](#), by Edward P. Zovinka PhD



Chemistry Matters Day 5: Lava Lamps



Materials:

Clear Plastic Bottle with Lid	1
Vegetable Oil	2 cups
Water	1/4 cup
Food Coloring	3 colors (optional)
Alka-Seltzer Tablet	1 tablet
Measuring Cups	1 set
Cup filled with Water	1

Video Link: <https://youtu.be/bIPmPsfTX5A>

Background:

- As the Alka-Seltzer tablet gets wet, it releases sodium bicarbonate and citric acid which react to produce carbon dioxide. These tiny bubbles of CO₂ stick to water molecules and carry them in large bubbles to the top of the bottle. When they get to the surface, the gas is released and the water slowly floats back down through the oil.

Vocabulary:

pH	the scale which measure hydrogen and hydroxide molecules to determine whether a substance is an acid or a base.
Acid	a chemical containing a disproportionate amount of hydrogen (H), making it corrosive.
Base	a chemical containing a disproportionate amount of hydroxide (OH) molecules, making it corrosive.
Reaction	process of atoms in the same or different chemicals rearranging themselves to form a new substance.
Corrosive	destructive by means of chemical erosion.

Preparation:

Plan to do this experiment on a surface that is easily cleaned.

Instructions:

- Pour 2 cups of oil into water bottle.
- Mix the food coloring with your water.
- Pour your colored water into the plastic bottle with oil until it is almost full. Leave an inch or two at the top for the **reaction** to take place.
- Add ½ of an Alka-Seltzer tablet to the bottle and watch the water bubble and fizz through the oil.
 - Look around the bubbles of water. You see the tiny carbon dioxide (CO₂) bubbles lifting the oil droplets.
- After you have completed the experiment, put the lid on your bottle tightly. You can reuse this bottle and do this experiment again, by simply adding a new Alka-Seltzer tablet.

Evaluation:

- When you mix hydrogen with oxygen you get something called a hydroxide; is this an **acid** or a **base**?
- Why did your water and oil mixture start to bubble when you added the Alka-Seltzer?
- Which elements combined to make the **reaction** occur?

Further Exploration:

Visit...

- <https://www.acs.org/content/acs/en/education/whatischemistry/adventures-in-chemistry.html> to find chemistry activities for children, written by the American Chemical Society.

Read...

- [Reactions: An Illustrated Exploration of Elements, Molecules, and Change in the Universe](#), by Theodore Gray

