

STEM AT HOME ACTIVITY GUIDE: Potion Lab



STEM AT HOME GUIDE: Potion Lab Background Knowledge

Aim: Experiment with different states of matter to create your own mad scientist potions!

Problem & Career Focus: Chemistry is a branch of science that uses the properties of matter (solids, liquids, and gases) and the interactions between humans. Chemistry is a part of our everyday lives. But wait. There is a disease on the loose in your community that is making everyone sick. This disease has no treatment available. Using the scientific method, your task is to work with your team of scientists: chemists, pharmacists, and immunologists to experiment creating different potions to save your community.

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Scientific Method: Scientists use the scientific method to guide their experimentation with different materials! With your team: ask questions, discuss what you observe, and use your problem-solving skills as you create your potions! Use the scientific method steps to guide your exploration during the Potion Lab.

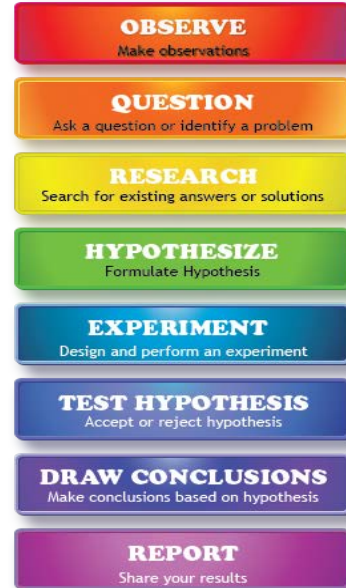
Educational Standards Correlations: Matter, Life Science, Chemistry

Investigating Questions

- How does mixing different solids and liquids create gases?
- What potion combinations created changes in color?
- What different combinations created changes in the states of matter (from a solid to a liquid, liquid to gas, etc.)?

Materials

- Various jars, containers, cups, or bowls
- Absorbent place mats and/or paper towels
- Turkey baster, eye dropper
- Small measuring cups
- Shampoo
- Dish soap
- Baking soda
- Water
- Food coloring
- Eye protection, apron or lab coat
- Any other household materials that are solids or liquids



STEM AT HOME GUIDE: Potion Lab

Background Knowledge

Vocabulary:

Matter: Everything around you! It's anything that has mass and takes up space (it has volume). 3 states of matter: solid, liquid, and gas.

Solid: State of matter that keeps its shape; molecules are closely packed together.

Liquid: State of matter that's a fluid and takes the shape of the container it's in.

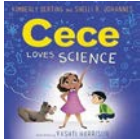
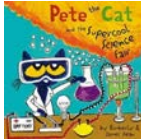
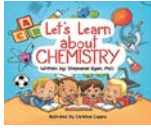
Gas: State of matter that has no fixed shape and no fixed volume.

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STEM Career Connections:

<p>Chemist</p> <p>A scientist that researches chemical substances, performs experiments, and investigates properties of matters.</p> <p>They create: plastics, household cleaners, drugs doctors prescribe when you are sick, and more.</p>	<p>Pharmacist</p> <p>Are scientists and medical experts. They work with doctors to prepare, dispense prescriptions and ensure no harmful drug interactions happen to you.</p> <p>They create: drug prescriptions, conduct health and wellness checks, and more.</p>	<p>Immunologist</p> <p>A scientist that studies and treats the physical, chemical and physical characteristics of our immune systems so we stay healthy</p> <p>They create: vaccines, treatments for asthma, allergies, and other treatments used for infections.</p>
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Literacy Connections:

<p>Cece Loves Science by Kimberly Derting and Shelli R. Johannes</p> 	<p>Pete the Cat and the Supercool Science Fair by James Dean and Kimberly Dean</p> 	<p>Let's Learn About Chemistry by Stephanie Ryan, PhD</p> 
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Background Knowledge

Real World Applications: Chemistry and the states of matter are a BIG part of our everyday life! One can easily observe this branch of science in the different environments of human life: the food we eat, the air we breathe, the different cleaning agents we use, even human emotions are sometimes a result of chemical reactions within our body. Some examples of chemical reactions you can experience each day: photosynthesis (plant growth), digestion (your body's breakdown of food), medications, and MORE.

In this experiment, your team will experience **chemical reactions** and **physical changes**



Chemical reactions happen when one or more chemicals are changed into one or more other chemicals. For example: iron and oxygen combining to make rust. Or mixing vinegar and baking soda to make sodium acetate.

Physical changes happen when one state of matter changes into a different state of matter. For example: a solid ice cube melting into a liquid. Or separating a mixture, cutting, denting, or stretching solids.



Everyday Chemistry: Recycling!

Recycling is a way to take trash and turn it into new products. There are a number of different recycling processes that allow materials to be used more than once.

Aluminum cans were one of the first items to be recycled! The cans are first shredded and then melted (state of matter changes from solid to liquid!). From there aluminum can be used to make new cans and other items we use every day. Plastic bottles can be turned into a new fiber for making carpets or clothing and so much more.



Fun Facts:

- Used paper can be recycled up to 7 times!
- Some waste material is turned into electricity energy by burning it in modern incinerators!
- In 2009, the United States recycled around 7 million tons of metal! That's 1/3 of all it's waste!

Check out these video links!

Bill Nye the Science Guy Phases of Matter:

<https://www.youtube.com/watch?v=k3SJuoZgbfU>

Matter Compilation: Crash Course for Kids:

<https://www.youtube.com/watch?v=wyRy8kowsM8>

Science Max: Solids, Liquids, and Gases:

<https://www.youtube.com/watch?v=LqCsYwz8Q7s>

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STEM AT HOME GUIDE: Potion Lab Activity Directions

Aim: Experiment with different states of matter to create your own mad scientist potions!

Instructional Video: <https://youtu.be/Co-cPRWPUIk>

Investigating Questions

- How does mixing different solids and liquids create gases?
- What potion combinations created changes in color?
- What different combinations created changes in the states of matter (from a solid to a liquid, liquid to gas, etc.)?

Materials

Various jars, containers, cups, or bowls	Absorbent placemats and/or paper towels
Turkey baster, eye dropper	Small measuring cups
Shampoo	Dish soap
Baking soda	Water
Food coloring	Eye protection, apron or lab coat
Juices from squeezed fruit (lemons, oranges)	Any other household materials

Instructions

Make sure to perform the experiment as a family team. If it's great weather outside, this is a perfect activity for a sunny day. This experiment is structured to allow creativity flow. Allow your team to experiment freely with different combinations of solids and liquids to observe the results.

- Lay out all materials on a flat surface, or table on top of placemats or a tablecloth.
- Parent: (Optional) Freshly squeeze the juice from any of the fresh fruits you choose.
- Make sure to put on an apron or cover up on top of clothes. This could get messy!
- Make sure to wear eye protection.



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- Looking at your materials, discuss as a team guesses (hypothesis) of what might happen when you begin to mix some of the materials together. What colors might be created?
- Add a few drops of food coloring into containers or jars with water.
- Start experimenting! Choose one of the household items to start creating potion combinations!
- Make observations on what happened to the materials inside the containers. Did any colors change? Did your team observe any physical changes or chemical reactions?

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Photo Guide



Step 1: Lay out all materials on a flat surface, with protection for floors. Wear an apron for messes!



Step 2: Squeeze juices into bowls. Add food coloring and other ingredients to experiment with.



Step 3: Start experimenting! Choose one of the household items to start creating potion combinations!



Step 4: Make observations on what happened to the materials inside the containers. Did any colors change? Did your team observe any physical changes or chemical reactions?

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Photo's courtesy of: Busy Toddler

STEM AT HOME GUIDE: Potion Lab Extension Activity

Rainbow Rocks Chemistry

Materials:

Baking Soda	Water
Food Coloring	Parchment Paper
Muffin silicone mold	Freezer
Bowl	Disposable gloves
Vinegar	Syringe or cup
Large dish or container	

Instructions

Making Secret Rainbow Centers for Erupting Rocks

- Add 2 cups of baking soda to a bowl.
- Add 1 tablespoon of water and mix together with your hands.
- The mixture needs to be the consistency of damp sand and very moldable.
- Take a teaspoon worth of the mixture and form into a ball (called pebbles).
- Set the pebble on parchment paper on a tray that can fit into the freezer.
- Once pebbles are set on the tray, add a few drops of red food coloring to pebbles. Continue with all the colors of the rainbow (red, orange, yellow, green, blue, and purple) until each pebble is a color of the rainbow.
- Set in the freezer for at least 2 hours.

Rainbow Rocks

- After two hours, take the remaining white mixture. Add water to regain the damp sand consistency and mix well.
- Remove the small colored pebbles from the freezer.
- Using a muffin pan, place some of the white mixture to the base of the muffin tin and press firmly.
- Add one colored pebble to each of the muffin tin holes.
- Pack the remaining white mixture on top of the pebbles and press down firmly. Repeat for each pebble in the muffin tin.
- Place muffin tin back in the freezer overnight.

Erupting Rocks: Now it's time for the magical rainbow reveal!

- Take large rocks out of freezer.
- Place in a large dish or casserole pan.

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- Using a syringe or cup and pour vinegar over your rocks to start the reaction.
- At first you will observe bubbles, but soon the colors will start to emerge and swirl.
- Wait a few moments and observe the rainbow reaction! Discuss observations as a family team.
- Keep adding vinegar to the rocks until all the baking soda has reacted.
- Discuss as a family team the rainbow rock color explosions.

Want bubblier awesomeness? Add a drizzle of dish soap to the dish. It will add an extra level of bubbly, foamy fun!

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