

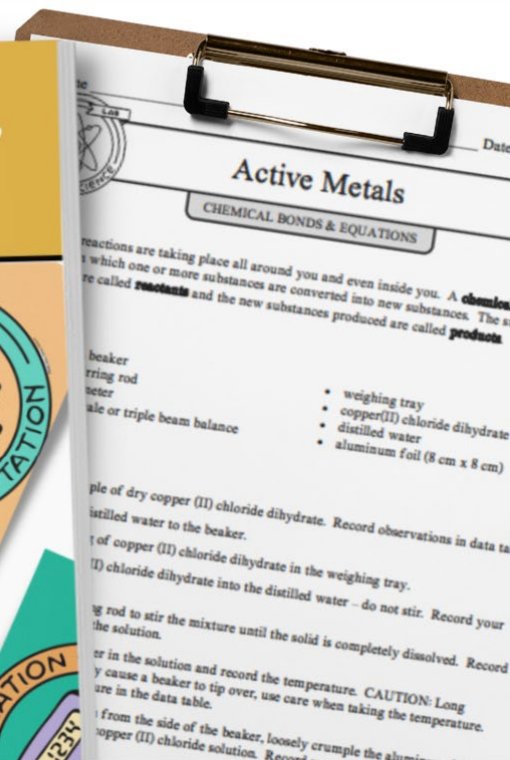
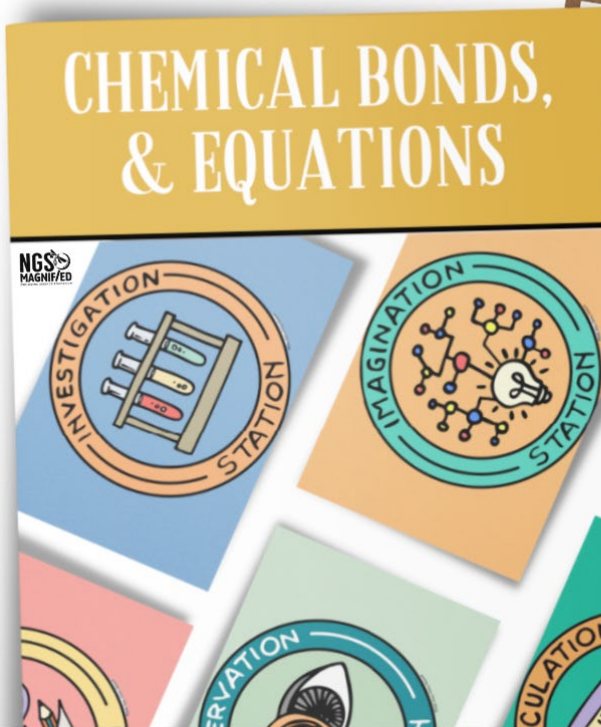


Demos, Labs, & Science Stations
Feature:

- Hands-on Investigations
- STEM Challenge
- Scientific Literacy
- Inquiry Process Skills

PHYSICAL SCIENCE - 5E

NGSS · TEKS



DEMOS, LABS, & SCIENCE STATIONS

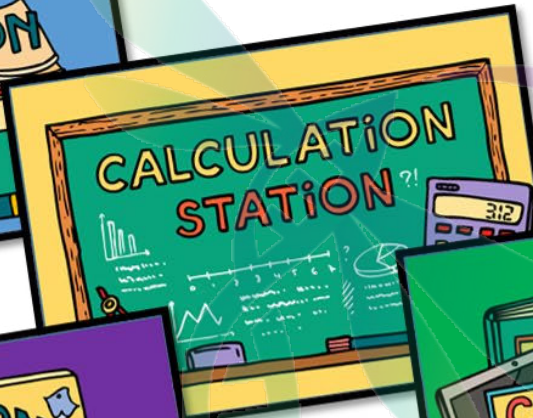
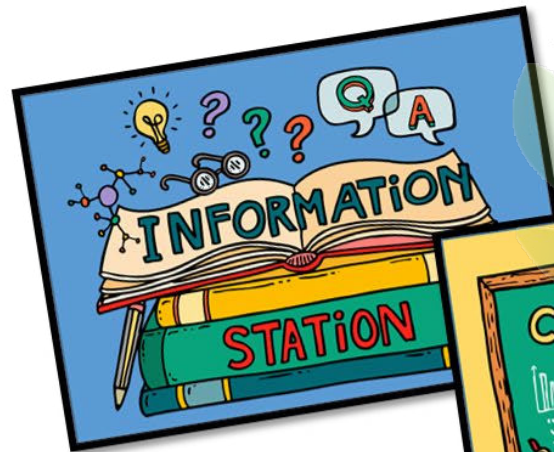
HANDS-ON · STEM · CRITICAL THINKING

**ENGAGING
READING!**

**GRAPHING,
WORD
PROBLEMS &
MEASUREMENT!**

**INQUIRY
SKILLS &
PROCESSES!**

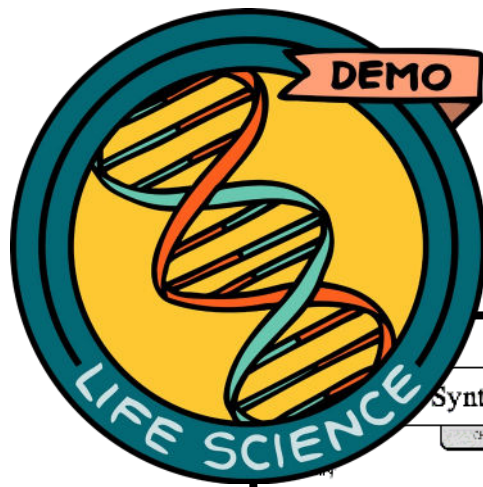
**HANDS-ON
INVESTIGATIONS!**



STEM CHALLENGES!

ALL Station Signage Included!!

Color & Black and White



Teacher guide and answer key
offered for every lab!

Easy-to-get materials!



Synthesis Reaction

CHEMICAL BONDS & EQUATIONS

Students will observe that chemical reactions can occur quickly or slowly.

Materials:

- steel wool
- digital scale or triple beam balance
- beaker or Bunsen burner
- tongs
- glass dish

Procedures:

Before class (three days before):

1. Measure and record the mass of a piece of steel wool.
2. Wet the steel wool thoroughly with water and place the steel wool in the glass dish at room temperature.

During class:

3. Explain to students what you did three days prior to the wet steel wool. Then, have them predict the new mass of the steel wool.
4. Measure steel wool is completely dry and measure and record its final mass.
5. Take a second piece of steel wool and measure and record the mass.
6. Have students predict what will happen to the mass when it's heated in a flame.
7. Use the tongs to hold the steel wool in the flame for several minutes. Have students make observations.
8. Measure the mass of the oxidized steel wool. Repeat step 7 until there is no more change in mass.

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Discussion questions and
teacher set-up included!

Active Metals

CHEMICAL BONDS & EQUATIONS

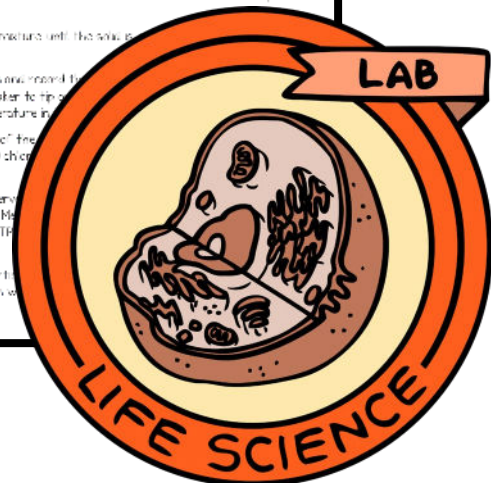
Chemical reactions are taking place all around you and even inside you. A **chemical reaction** is a change in which one or more substances are converted into new substances. The substances that react are called **reactants**, and the new substances produced are called **products**.

Materials:

- 100 mL beaker
- glass stirring rod
- thermometer
- digital scale or triple beam balance
- weighing tray
- copper(II) chloride dihydrate
- distilled water
- ammonium hydroxide (8 and 16 M)

Procedure:

1. Observe a sample of dry copper(II) chloride dihydrate. Record observations in data table.
2. Add 25 mL of distilled water to the beaker.
3. Measure out 1.7 g of copper(II) chloride dihydrate in the weighing tray.
4. Pour the copper(II) chloride dihydrate into the distilled water – do not stir. Record your observations.
5. Use the glass stirring rod to stir the mixture until the solid is gone. Record your observations of the solution.
6. Add the thermometer to the solution and record the temperature. Be careful not to touch the thermometer to the sides of the beaker to tip it over. Record the initial temperature in the data table.
7. Observe the solution from the side of the beaker and drop it into the copper(II) chloride dihydrate. Record your observations in the data table.
8. Stir the mixture occasionally and observe the temperature. Record the final temperature in the data table.
9. Once the mixture is cool, the solid portion can be poured down the drain.





Group members will read a passage and then complete a task to help increase science literacy and deepen their understanding of the science concept.



Reactive Fashion

Hair coloring is enjoyed by both men and women all over the world. It dates back to ancient Greece when the Greeks would lighten and darken their hair, symbolizing honor and courage.

In 1909 a French chemist, Eugene Schuller, created the first safe commercial hair coloring based on a chemical called para-aminodiphenylamine. However, this chemical dye wouldn't work unless two other chemicals were used as well – hydrogen peroxide and ammonia.

Hydrogen peroxide is important because it helps begin the color-changing process. Before a new color is added to hair, the current color of the hair needs to be destroyed. To destroy the color, the pigments in your hair must be broken down. The chemical agent that enters the hair to break down the pigments is called hydrogen peroxide.

Now the question remains, how does hydrogen peroxide get into the hair? This is where a protective layer called a cuticle barrier needs to be "lifted" for the dye to penetrate the hair's pH, making the cuticle porous. Hydrogen peroxide can enter and destroy the pigment. Unfortunately, the action of lifting the cuticle to allow the dye to enter the hair, since it's not meant to be broken down, is a significant drawback.

A fashion designer, Lauren Bove, once had a problem with her hair. She was dyeing her hair, and she set out to use her knowledge of chemistry to solve her problem. She used her knowledge of chemistry to create a hair dye that would not damage the hair. She used different temperatures and times to create a hair dye that would not damage the hair.

Bove's hair dye is called "Reactive Fashion". It is a hair dye that does not damage the hair. It is a hair dye that does not damage the hair.

Bove's hair dye is called "Reactive Fashion". It is a hair dye that does not damage the hair. It is a hair dye that does not damage the hair.

A

What is the purpose of hydrogen peroxide in hair coloring?

B

How does hair get damaged in the coloring process?

C

Other uses can be imagined for reactive fashion?

D

Other uses can be imagined for reactive fashion?

A

Oh no! I've lost an electron.

Are you sure?

B

C

1. The Statue of Liberty is made of copper. Explain why you think the Statue of Liberty is made of copper.

2. Explain why you think the Statue of Liberty is made of copper.

D

Other uses can be imagined for reactive fashion?

Group members will have images, illustrations, or actual samples at this station that show applications or processes of the science topic.



Group members will work with one another to explore the concept through hands-on activities, so they may practice specific inquiry process skills as they learn.



A Salty Connection

Problem: Can saltwater be a good conductor of electricity?

Name _____ Date _____

Materials:

- 2 wooden popsicle sticks
- 1 broken light bulb
- distilled water

Procedure:

Part A: Build a Circuit

- When two popsicle sticks with one end broken, lay them side-by-side.
- Connect a copper wire to each stick, leaving the other end of the wire free.
- Connect the opposite end of the two wires to the light bulb.
- Connect the other end of the two wires to the light bulb.
- Use the third piece of copper wire to connect the two wires to the light bulb.
- Test out your circuit by touching the ends of the wires to the light bulb.

Part B: Test a Circuit

- Pour 1 cup of distilled water into a beaker.
- Put the two electrodes in the water. The light bulb should glow.
- Remove the electrodes from the water.
- Replace the electrodes in the water. Your answer should finally glow.
- Answer the questions on your worksheet.

Directions: Complete the data table below by recording your observations.

Water without salt	Water with salt
Sketch of Saltwater Circuit	

Analyze and Conclude:

- What is an ion?
- When salt (NaCl) enters water, the water causes the sodium and chlorine atoms to pull apart, resulting in sodium ions and chlorine ions being formed. Use this information to help you explain how this saltwater circuit worked.





A



B

Describe covalent and ionic bonds.

Explain why sodium and potassium will not form a bond with chlorine.



C



B

Identify two for each chemical change.

A: Ionic bonds occur between opposite charges of the ions in an ionic compound – a transfer of electrons.

A: Sodium and potassium bond easily with atoms that accept electrons. They would not bond with one another because both tend to lose electrons.



A



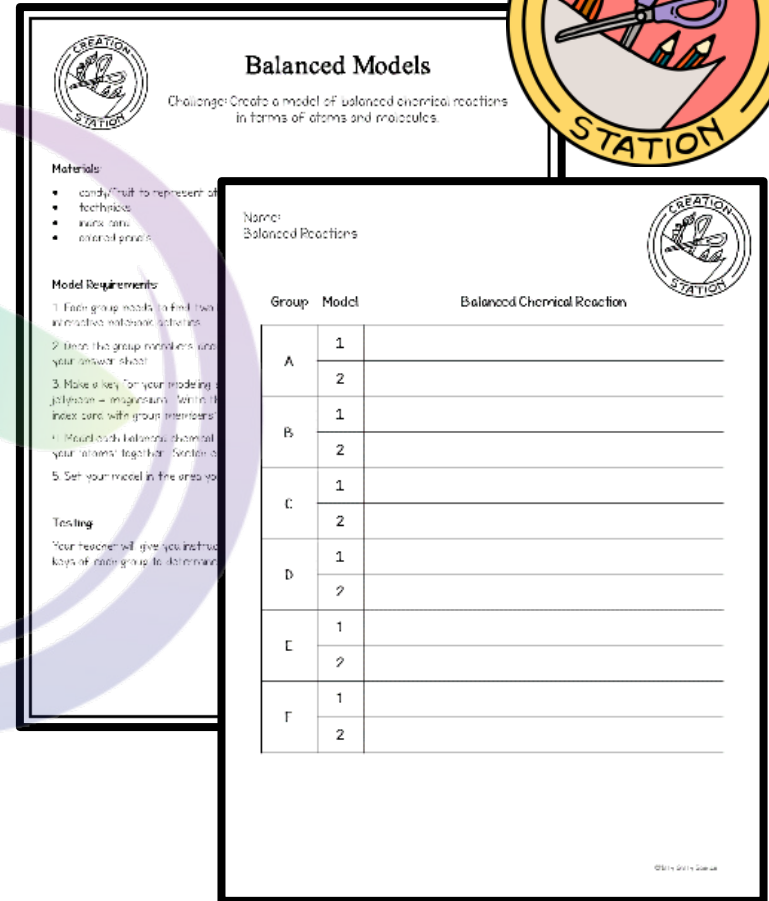
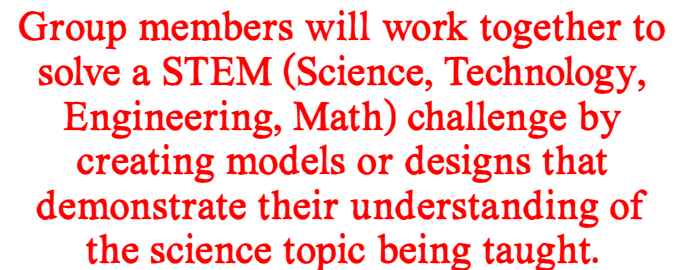
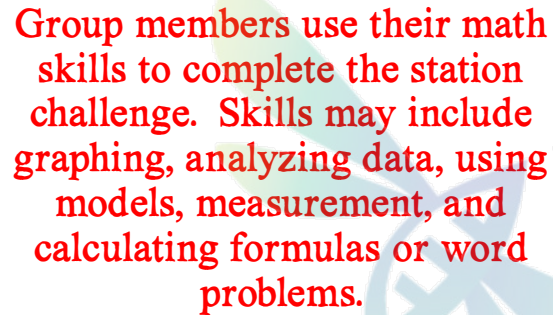
B

Identify two for each chemical change.

A: Ionic bonds occur between opposite charges of the ions in an ionic compound – a transfer of electrons.

A: Sodium and potassium bond easily with atoms that accept electrons. They would not bond with one another because both tend to lose electrons.

There are three different options for this station: interviews, videos, or group essay. Depending on the option you choose, group members will communicate what they know by answering questions in creative ways.





This station makes science concepts relevant for students by asking them to imagine scenarios that will bring about discussion and critical thinking.

USER-FRIENDLY PAGES:

Students easily recognize which answer sheet to use at each station by matching station icons located on each page!



A Chemistry Campfire

Directions: Use your imagination to answer the statement below

IMAGINE you have invented the s'more.



What type _____

the perfect s'more?

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Drip, Drop, Splatt!

Problem: How does the density of a liquid and drop height effect the size and shape of liquid splatters?

Materials:

- colored water (graduated cylinder A)
- colored syrup (graduated cylinder B)
- eye dropper
- paper
- metric ruler
- meter stick

Procedure:

1. Make a hypothesis of how density of a liquid will effect splatter size on your lab sheet.
2. Place the piece of paper down on the lab table in order to catch splatters.
3. Measure the heights listed in the data table using a meter stick. Place meter stick with end starting at zero on paper and move up stick when increasing height of drop.
4. Use the eye dropper to drop ONE drop of colored water and ONE drop of colored syrup. Make sure to drop on different places on paper.
5. Measure the size of the splatter in MILLIMETERS. Record in data table on answer sheet.
6. Repeat for each height.
7. Use the collected data to graph the splatter size versus drop height for each liquid.

Analyze and Conclude

1. Was your hypothesis correct? Explain.
2. What were two controls in your experiment that helped you collect the most accurate data possible?

Date: _____

Hypothesis

	Drop Height (cm)			
	5	25	50	100
Water				
Syrup				

Height of Drop vs Splatter Size

Height of Drop (cm)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
Size of Splatter (cm)																					

Legend:
☐ Water
☐ Syrup

Analyze and Conclude:

1. _____
2. _____

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TEACHERS SAVE TIME:

Laminate station pages and reuse for each class and for years to follow!

Inquiry and Process Skills

©NGS

 Demo

 Guided Inquiry Lab

 Science Stations

Inquiry-Based Science Unit: Chemical Bonds and Equations	Classifying	Communicating	Compare & Contrast	Creating Models	Gather/Organize Data	Generalizing	Identifying Variables	Inferring	Interpreting Data and Graphs	Making Decisions	Manipulating Materials	Measuring / Calculating	Observing	Predicting
Synthesis Reaction	X	X	X			X		X		X	X		X	
Active Metals		X	X	X	X		X		X		X	X		X
Information Station: Reactive Fashion		X	X		X	X		X		X			X	
Observation Station: Images & Questions	X		X		X	X		X					X	
Investigation Station: A Salty Connection	X		X		X		X		X		X		X	
Calculation Station: Criss-cross Method					X		X			X		X		
Communication Station: Questions	X	X				X				X				
Creation Station: Balanced Models		X		X	X				X	X	X	X		X
Imagination Station: A Chemistry Campfire		X		X						X				X

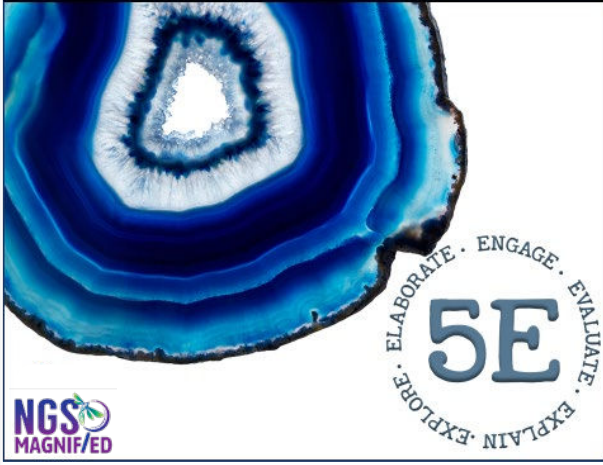
NGS Magnified promotes scientific inquiry throughout the curriculum. Students become more confident and effective learners while developing problem-solving and critical thinking skills. Process skills, such as planning, organizing, and evaluating, help students to complete projects and assignments. These skills allow students to independently gather information, analyze it, and draw their own conclusions.

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