Physical vs. Chemical Changes Lesson 2: *The Make*

Student Guide

Today you'll need to gather evidence of the changes from a variety of stations and categorize these examples as either physical or chemical changes.

Your *Make* task today is to:

1. Go to stations that feature different types of substances interacting.
2. Make observations from these interactions.
3. Decide whether the interactions are the result of physical or chemical changes.
4. Make a chart categorizing your results.

Planning Organizer

Physical Change Clues	Chemical Change Clues
• Change in shape • Change in size • Molecules stay the same • Change in state (solid, liquid, gas) • Dissolving • Dilution • Tearing, bending, breaking • Usually easily reversible	• Change in color • Change in smell • Change in texture • Absorbs or gives off heat • Produces light • Produces gas in form of bubbling or fizzing • Molecules change • Not easily reversible

- If you are doing this in class, you will visit a series of stations. Follow the directions on the Station Card and record your answers.
- If you are doing this virtually, view the video for each station and record your answers.

Station 1: Alka-Seltzer and Water

Complete the directions on your station card.
View the virtual station.

1. Sketch and label what you see.

2. What is happening at the surface of the Alka-Seltzer tablet?

3. What is happening with the amount of air in the ziplock bag as the change occurs? Where is this air coming from?

4. Is this interaction between water and the Alka-Seltzer tablet a **physical** or **chemical change**? Support your answer with evidence from your observations.

Station 2: Ice in a Beaker

Complete the directions on your station card.
View the virtual station.

1. Sketch and label what you see.

2. What happened to the temperature over time?

3. What is happening to the volume of the liquid?

4. Is this interaction between ice and water **a physical or chemical change**? Support your answer with evidence from your observations.

Station 3: Iodine on a Potato

Complete the directions on your station card.
View the virtual station.

1. Sketch and label what you see.

2. Carefully observe what happens when the iodine drops on the potato slice. What do you notice immediately?

3. Do you notice any differences if the iodine is placed in the center or edge of the slice? What happens to the color over time?

4. Is this interaction between potato and iodine **a physical or chemical change**? Support your answer with evidence from your observations.

Station 4: Paper Ripping

Complete the directions on your station card.
View the virtual station.

1. Sketch and label what you see.

2. Is it **a physical or chemical change** when the paper is torn? Support your analysis with evidence from your observations.

Station 5: Liver and Hydrogen Peroxide

Complete the directions on your station card.
View the virtual station.

1. Sketch and label what you see.

2. What do you see after the piece of liver is pushed down into the hydrogen peroxide?

3. Is this interaction between hydrogen peroxide and liver **a physical or chemical change**? Support your analysis with evidence from your observations.

Station 6: Baking Soda and Vinegar

Complete the directions on your station card.
View the virtual station.

1. Sketch and label what you see.

2. What happens when you put vinegar onto the baking soda?

3. Is this interaction between vinegar and baking soda **a physical or chemical change**? Support your analysis with evidence from your observations.

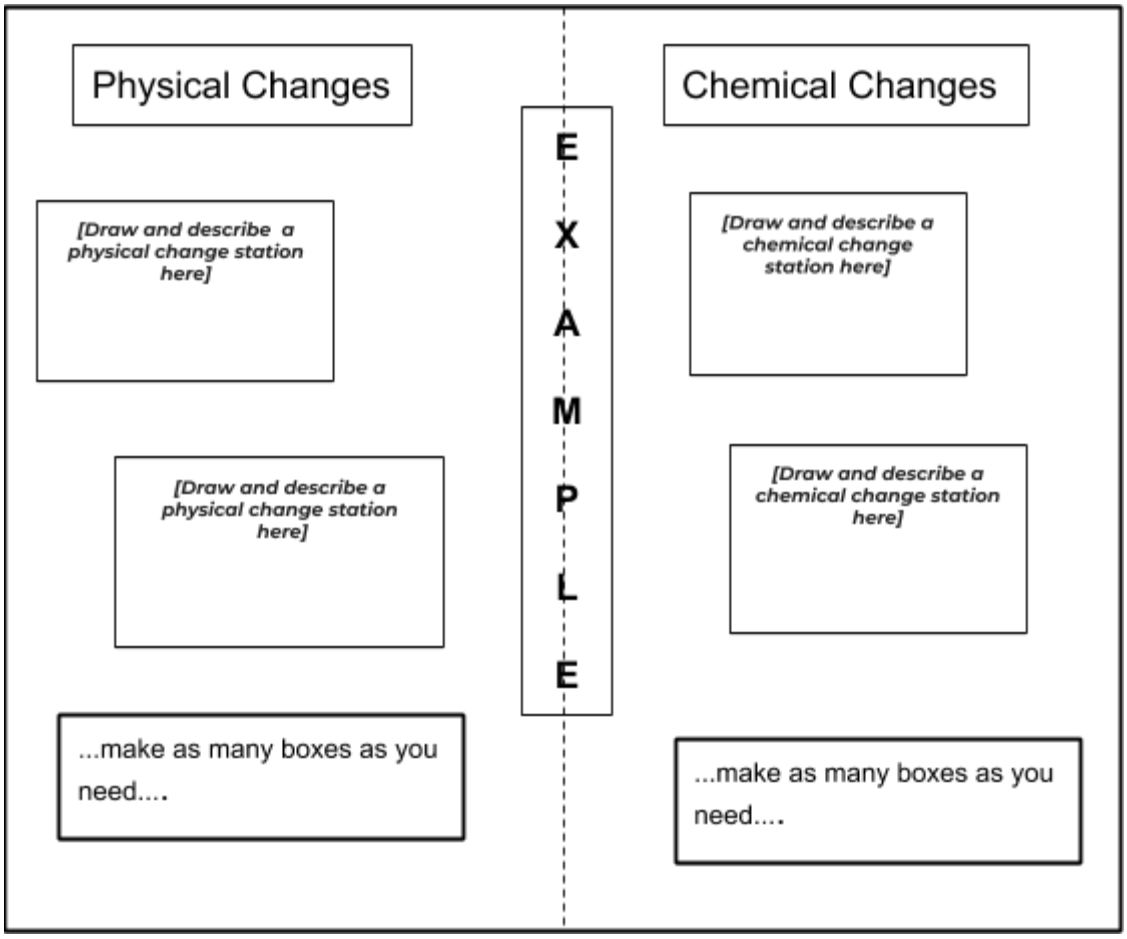
Optional Extension

Are any of the interactions you observed reversible? Note: If something is "reversible" it means that it can go back to its original form. Do some research to find out!

	Easily Reversible?	If No: Why Not? If Yes: How?
Station 1: Alka-Seltzer and Water		
Station 2: Ice in a Beaker		
Station 3: Iodine on a Potato		
Station 4: Paper Ripping and Crumpling		
Station 5: Liver and Hydrogen Peroxide		
Station 6: Baking Soda and Vinegar		

On separate paper provided in class, make a chart with visuals categorizing

your results. An example is provided below.



Name: _____ **Date:** _____

Exit Ticket: Connection to *The Engineer*

1. How did you know a chemical change happened?

2. How did you know a physical change happened?

3. Can you think of a way to control or prevent a chemical reaction?

4. In what ways can we control or prevent physical interactions?

5. Why is it difficult to reverse a chemical change?

6. Of the physical changes you observed, are any easily reversible? How would you do it?

***The Make* Assessment**

Use the Checklist and Science and Engineering Practices Rubric to ensure you have addressed all aspects of *The Make* with quality work.

Checklist

Your Challenge: Draw conclusions about the interactions of substances as evidence of physical or chemical interactions.

Project Completeness:

- ❏ Detailed observations from six (6) lab stations.
- ❏ Analyses are detailed in a chart.
    - ❏ Lab stations are described in words and visuals.
- ❏ Completed Student Guide is neat and chart is in color.

DCI Standards Checklist:

- ❏ Each lab station is identified correctly as a physical or chemical change.
- ❏ Lab stations are visually categorized into physical vs. chemical changes.
    - ❏ Explanation uses evidence to justify identification.
- ❏ If the Optional Extension was assigned to you: Each lab station is identified as reversible or not.
    - ❏ Explanation of how this is possible is detailed.

Science and Engineering Practices Rubric

	Emerging (1)	Developing (2)	Proficient (3)	Advanced (4)
Analyzing and Interpreting Data	Constructs data tables or graphs that do not display all data. Analyzes data with major misconceptions or omissions.	Constructs data tables or graphs that display all data, but does not analyze relationships. Analyzes data with minor misconceptions.	Constructs data tables or graphs that display all data and makes simple connections between variables. Analyzes data to provide evidence for phenomena.	Constructs data tables or graphs that display all data and makes complex connections between variables. Analyzes data to provide evidence for phenomena and acknowledges limitations.
Constructing Explanations or Arguments From Evidence	Constructs an explanation with no clear sources of evidence.	Uses scientific principles and/or data from at least one source to construct or evaluate an explanation, but explanation contains minor misconceptions.	Uses accurate but incomplete scientific principles and/or data from multiple sources to construct or evaluate an explanation.	Uses accurate and complete scientific principles and/or data from multiple sources to construct or evaluate an explanation.