Course: Physical Science **April 20th – April 24th**

Main Idea/Focus: Classifying Matter	**Aligned resource** (Foundations of Physical Science, CPO)

Standard(s):
How does this align with your state standards?

PSCI.PS1.3 – Construct a graphical organizer for the major classifications of matter using composition and separation techniques.
PSCI.PS1.1 – using the kinetic molecular theory and heat flow considerations, explain the change of state for solids, liquids, gases, and plasma.

Resource(s):
What do you need? Text, data sets, tools, etc.

Textbook: Foundations of Physical Science, CPO

- Chapter 10

Task(s):
What will you do? What will you investigate?

Part I – Classifying Matter

Can you name 10 examples of matter? Matter is any substance that has mass and takes up space. Everything is made of matter so any object you can name consists of matter. Basically, if it takes up space and has mass, it is matter.
Side Note: If you are reading this, you are made of matter and you DO matter! ☺ (science joke for you)

Matter can be divided into two categories: **pure substances** and **mixtures**.

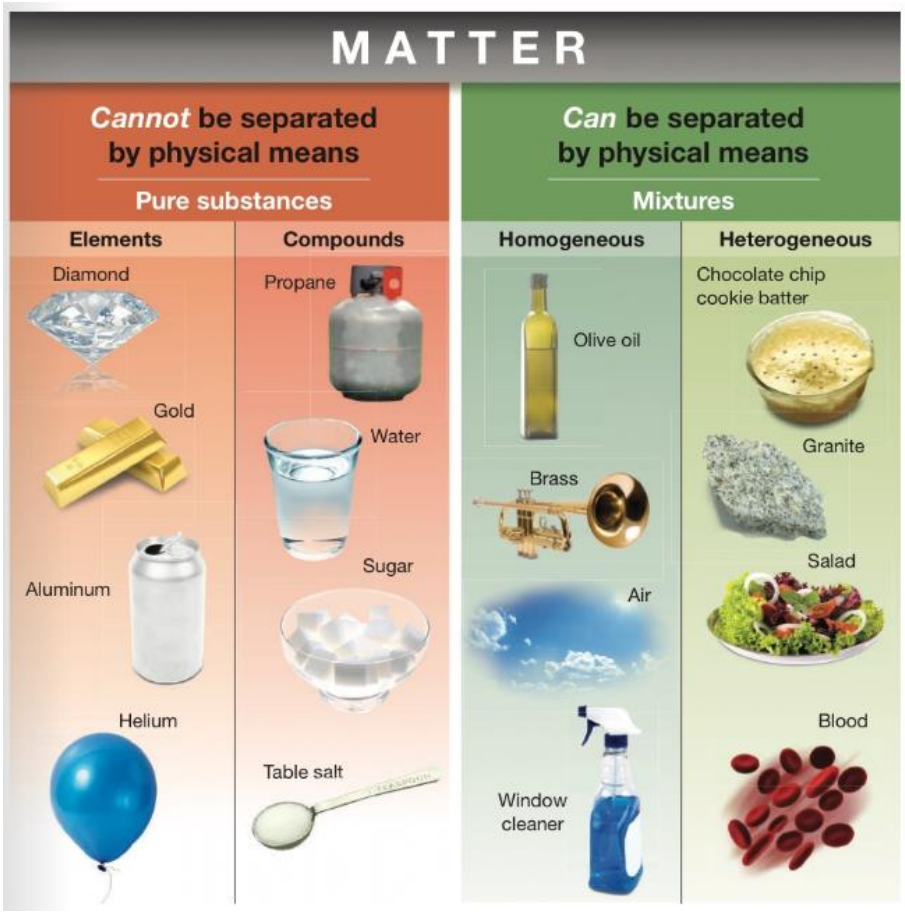
A pure substance cannot be separated into different kinds of matter by physical means such as sorting, filtering, heating, or cooling. Elements and compounds are pure substances. Examples include water, table salt, gold, and oxygen. A mixture contains a combination of different elements and/or compounds. All mixtures share one common property: They can be separated into different types of matter by physical means such as sorting, filtering, heating, or cooling. For example, cola is a mixture that can be separated into carbonated water, corn syrup, caramel color, phosphoric acid, natural flavors, and caffeine.

A **homogenous mixture** is the same throughout. In other words, all samples of a homogenous mixture are the same. For example, an unopened can of cola is a homogenous mixture. The cola in the top of the unopened can is the same as the cola at the bottom Once you open the can, however, carbon dioxide will excape from the cola making the first sip a little different from your las sip. Brass is another example of a homogenous mixture. It is made of 70 percent copper and 30 percent zinc. If you cut a brass candlestick into 10 pieces, each piece would contain the same percentage of copper and zinc.

A **heterogeneous mixture** is one in which different samples are not necessarily made up of exactly the same proportions of matter. One common heterogeneous mixture is chicken noodle soup. One spoonful might contain broth, noodles, and chicken, while another contains only both.

Something to think about: Not everything you encounter in the world is matter. Matter can be converted into energy, which has neither mass nor volume. So, light, sound, and heat are not matter. Most objects have both matter and

some form of energy, so the distinction can be tricky. For example, a candle flame certainly emits energy (light and heat), but it also contains gasses and soot, so it is still matter. How can you tell what's the matter? Matter is anything you can weigh, touch, taste, or smell.



Final Product(s):

What will you answer? What will you create? What will you communicate?

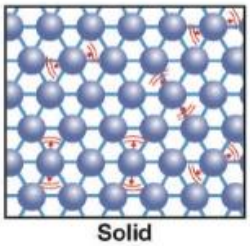
1. Obtain Information - Keep track of all the matter you use in one day and list each item on a piece of paper (or digitally).
2. Evaluate Information - Classify each item on your list as Pure Substances or Mixtures. Take it one step further and identify all of your pure substances as either elements or compounds, and your mixtures as homogenous or heterogeneous.
3. Communicate Information - Make an infographic, poster, drawing, or other display to show how the matter was classified.

Task(s):
What will you do? What will you investigate?

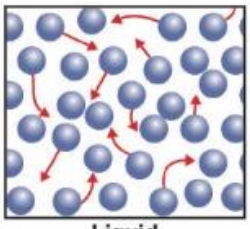
Part II – Phases of Matter

On Earth, pure substances are usually found as solids, liquids, or gases. These are called phases of matter.

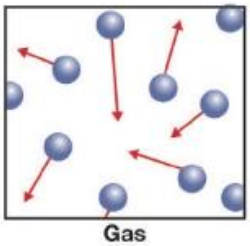
A **solid** holds its shape and does not flow. The molecules in a solid vibrate in place but, on average, do not move far from their places.


Solid

A **liquid** holds it volume but does not hold its shape – it flows. The molecules in a liquid are about as close together as they are in a solid. But they have enough energy to change positions with their neighbors. Liquids flow because the molecules can move around.


Liquid

A **gas** flows like a liquid but can also expand or contract to fill a container. A gas does not hold its volume. The molecules in a gas have enough energy to completely break away from each other and are much farther apart than molecules in a liquid or a solid.


Gas

Final Product(s):
What will you answer? What will you create? What will you communicate?

On a hot day, a glass of iced tea (or any cold beverage) has liquid water on the outside. The water does not come from the inside of the glass. The ice (the solid form of water) and cold liquid inside make the outside of the glass cold, too. This "outside" cold temperature causes water vapor in the air – a gas - to condense into liquid water on the exterior of the glass.

1. Develop a model – Start with a drawing of the glass of tea (used in the context above). Now, use arrows, symbols, and words to show what is happening at the level of atoms and molecules.
2. Construct an explanation – Why do water droplets form on the outside of the glass?

Activity & Application - *OPTIONAL* *What will you investigate? What will you explore?*	**Aligned resource**
Making SLIME (aka, a Viscous Liquid)	**Chapter 10 -Activity** (Foundations of Physical Science, CPO)

Resource(s):
What do you need? At home tools, lab set-up, etc.

- Glue (white or clear school glue) – Approximately 2 ounces or ¼ cup (amounts may vary depending on experiment)
- 1 tsp Baking Soda
- 2-3 tablespoons of saline solution (e.g., contact lens solution)
- Bowl
- Stirring stick

Note: There are many alternative recipes for slime available on the internet

Procedure:
What are the steps in the process?

In this activity, you will make a substance that appears to be both solid and liquid at the same time – a *viscoelastic* liquid. The *visco-* part of the term comes from the word viscous, which means "resistant to flow." You're probably familiar with the term *elastic*, which describes a material that can return to its original shape after being stretched.

1. Mix glue, baking soda and saline solution into a bowl.
2. Stir the mixture for 2-3 minutes.
3. Remove the mixture from the cup and knead it with your hands. It will be stick at first. Keep kneading until it is easy to pull the putty away from your hands in a single lump.

Conduct an experiment – *Check in with your teacher throughout this process. They will answer any questions you may have and assist with the set-up.*

1. Develop a procedure for measuring the substance's stretchiness. Example: How does the stretchiness of the substance change over time?
2. State your hypothesis.
3. Develop a procedure for testing your hypothesis. Remember, only one variable can be changed!
4. Create a data table to record your results.

Analysis and Conclusion:
What are the results? How are these results relevant?

1. Analyze your results (1) – Look at the data you collected. What patterns or trends did you notice throughout your trials? Did your results support your hypothesis?
2. Analyze your results (2) – What went "wrong" during your experiment and/or what would you do differently if you were to repeat this experiment? Think about how you controlled the variables, etc.
3. Construct an explanation – Use the knowledge of matter and phases of matter to explain what happened in your experiment. Your explanation may be supported by images and/or models.