Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

**Physical & Chemical Properties Lab** *(LT 1.5)*

**Essential Question** How do properties of matter allow us to determine identities of unknown substances?

You will be given a set of known substances. You will then document (create a data table!), measure, or calculate at least three different properties for each substance. From there, you will return the known substances to your teacher, who will then give you an unknown substance. The unknown substance will consist of one or more of the known substances. Your goal is to use what you know about the physical & chemical properties of matter, proportional relationships, and patterns to design and carry out an investigation that will enable you to collect the data you need to determine the identity of the unknown substance.

**Background Information:**

Compounds, elements, and mixtures have various physical and chemical properties that can help us identify them. A **physicalproperty** is one that can be observed without altering the substance. That is to say, it remains unchanged after the observation. Examples of this include, but are not limited to, color, odor, phase changes (boiling, melting, and freezing points), solubility, miscibility, hardness, and density. Each of these is observable without creating a new substance.

A **chemicalproperty** is essentially whether or not the substance will react with another substance. For instance, iron reacting with oxygen to form rust, and the fact that argon does not react with anything, are both chemical properties. Chemical properties are observed in a chemical reaction and a new substance is formed.

These substances can also go through chemical and physical changes. A **physical change** is a change that does not alter the bonds in a substance—no new substances are formed (no bonds are broken or rearranged). In a **chemical change**, a new substance is formed. Chemical changes can also be called **chemical reactions**. We can identify chemical reactions by several signs, including unexpected color changes, temperature changes, odor changes, the production of gas (bubbling), the formation of a precipitate, and a few others.

**Materials you can use to design your tests**

* 5 small plastic cups labeled #1 (Sugar), #2 (Corn Starch), #3 (Salt), #4 (Baking Soda), #5 (Flour)
* Vinegar
* Iodine
* Water
* Magnets
* Candle & Matches
* Small Foil Square
* Assorted glassware
* Spoons/popsicle sticks
* Something else? *Just ask!*

**Examples of tests you can perform** include observing the physical appearance of the substance, dissolving it in water, determining the melting time of the substance, etc.

In the space below, or on a separate piece of paper if you need more space, create a data table to record your observations/measurements. You should perform at least 3 investigations on each substance. *Remember how to format your data table?!*

**Lab Conclusion Questions**

1. What was the identity of your unknown substance?

Claim:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Evidence: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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Reasoning: *(Remember—The evidence shows…I know (scientific facts)…I can apply (big ideas/connect your ideas together)…Therefore…)* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. Which investigations that you used were determining physical properties? Explain

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1. Which investigations that you used were determining chemical properties? Explain.

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1. Which investigations would’ve been affected by the amount of the substance you used to perform the test? Explain.

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