

TEACHER NOTES

Physical and Chemical Properties of Matter

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This activity can be completed with the answer sheet on page 15 in the Properties of Matter unit in the LearnEd Notebooks program.

Introduction: In this investigation, your students will use the lab sheet and data table on the following pages to observe and analyze the physical and chemical properties of six unknown substances.

- Powdered sugar
- Baking soda
- Table salt
- Baking powder
- Granulated sugar
- Corn starch

Teacher Preparation: Fill six cups or beakers with each substance and label them 1-6. Be sure to make a teacher key for easy identification (but do not reveal the identities to your students). Place them in an area where students can easily access them. They will be refilling their containers from this station between each observation.

Clues: You may provide students with any of the following clues or allow them to research or infer the characteristics of each substance before providing them with the clues.

- Baking soda will be the most reactive to vinegar.
- Salt will dissolve more slowly than baking soda.
- Powdered sugar will dissolve more rapidly than granulated sugar.
- Corn starch will react to iodine (change to blue/black indicates a positive result).
- Salt crystals are cube-like.
- You can also discuss the commonly-known physical properties of each substance.

Additional physical/chemical property observations:

- Measure the volume of a marble by placing it in a graduated cylinder and measuring the change in water level.
- Observe oxidation in a slice of an apple as it browns (option: compare an apple slice to one that has been coated in lemon juice and allow students to explain why a difference can be observed).
- Observe a crayon heated to two different temperatures to observe melting point; teachers can prep this ahead of time and melt crayons into cupcake liners at various temperatures.
- Calculate the density of two different objects by measuring and completing $D=m/v$.
- Observe density by pouring water and vegetable oil into a bottle and allowing it to settle (option: create a density column using honey, dish soap, dyed water, vegetable oil, dyed rubbing alcohol).

Physical and Chemical Properties of Matter

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Introduction: You have learned that all matter has physical and chemical properties and many of these properties are easily observable. In this investigation, you will observe the physical and chemical properties of six unknown substances. Using the provided clues, can you identify each one?

Materials:

- Unknown samples (teachers will distribute and label them by number without revealing their identities): granulated sugar, baking soda, powdered sugar, table salt, corn starch, baking powder
- Microscope
- Microscope slide
- 6 small cups or containers
- 6 plastic spoons or lab spatulas
- Iodine
- Pipet
- Vinegar
- 10 ml Graduated
- Water
- 100 ml beaker
- Teaspoon (5 mL)
- Stopwatch

Procedure:

- Observation 1: General physical properties using standard lab safety procedures
 - Label the cups or containers 1-6 and add a small spoonful of each unknown into its corresponding container. Make general observations about the texture, color, and odor of each one and record in Data Table 1. Save these samples for the next observations.
- Observation 2: Microscopic observations
 - Observe the structure of each substance's crystals or particles. Place a very small pinch of unknown 1 on a glass slide and observe using the low and medium power objectives. Record your observations in Data Table 1 and repeat for unknowns 2-6.
- Observation 3: Reaction to iodine
 - Using the cups of each unknown from Observation 1, add 1 drop of iodine to each sample. A blue/black color change indicates a positive reaction. Record your observations in Data Table 1. Discard each unknown and save the containers for the next observation.
- Observation 4: Reaction to vinegar
 - Add a small spoonful of each unknown into its corresponding container. Using the pipet or a graduated cylinder, add 1 ml of vinegar to each unknown. Record your observations in Data Table 1. Hint: Baking soda will be more reactive to the vinegar due to the fact that it is purely basic and baking powder is a mixture with acidic ingredients that slow the reaction to vinegar. Discard each unknown and save the containers for the next observation.
- Observation 5: Dissolving in water
 - Measure 1 teaspoon of each unknown into its corresponding container. Add 100 ml of water to each container and record the amount of time it takes for each one to dissolve. Record your results in Data Table 1.
- Make your predictions in Data Table 1. At the end of the lab, your teacher will reveal the identities of each unknown substance. Discuss your results in the space provided.

Name: _____

Date: _____

Observations & Results

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Data Table 1:

	Unknown 1	Unknown 2	Unknown 3	Unknown 4	Unknown 5	Unknown 6
Observation 1						
Observation 2						
Observation 3						
Observation 4						
Observation 5						
Prediction						
Identity						

Discussion & Conclusion: How can you use the physical and chemical properties of a substance to identify it? Were your predictions correct?
