

Mystery Powders

Lesson Concept Matter changes based upon its properties. Matter can be changed physically or chemically.

Link In the previous lessons students learned about the indicators of chemical change: gas production, color change, temperature change, precipitate formation, or light production. In this lesson students will apply what they know about the physical and chemical properties of matter to identify matter.

Time 1 hour 15 minutes

Materials Whole class

1 250 mL beaker of salt

1 250 mL beaker of sugar

Per Group (groups of 4)

120 mL (1/2 cup) Baking Soda

120 mL (1/2 cup) Baking Powder

120 mL (1/2 cup) Baby Powder

120 mL (1/2 cup) Corn Starch

120 mL (1/2 cup) Potato Starch (for extend activity)

120 mL (1/2 cup) Mystery Powder (Baking Powder)

120 mL (1/2 cup) Water

120 mL (1/2 cup) Vinegar

120 mL (1/2 cup) Iodine Solution

1 tray for experiment-to control mess

Condiment cups

3 droppers-one for each liquid

Individual

Mystery Powder worksheet

Advance

preparation

1. Set up stations with one of each powder and liquid, i.e., put powders in beakers and liquids in cups with droppers.
2. Set up teacher station with sugar and salt.
3. Copy Mystery Powders lab paper.
4. Enlarged Mystery Powder Lab Sheet (on poster board)

Procedure:

Engage ***(10-15 minutes) Identify substances based on their chemical properties.***

1. Show students a beaker of salt and sugar. Explain that these substances have chemical and physical properties. Ask students to observe the substances. For instance, the substances are both white. The color, size, or shapes are physical properties. They also have chemical properties. When someone tastes them, one is sweet and one is salty. This is because they have different chemical properties; the taste would be a chemical property.
2. Explain that every substance has different properties. Some are physical and some are chemical. Physical properties can be observed. The chemical properties of matter can be observed as substances interact with each other substances and change. A scientist can use both physical and chemical properties to identify a substance.
3. Make a chart for physical and chemical properties.
4. Set the stage for a mystery investigation by explaining, "On the way to school the powders for this lab fell off the seat in my car. I now have an unknown substance that I need help identifying." Explain to students that it is their job to identify the mystery powders.

Explore ***(25-30 minutes) Identify a substance based on a chemical property.***

5. Introduce the experiment to the students by showing them the material they will be using. At each station there will be a set of 4 powders and 3 liquids, plus a "mystery powder".
6. Have a demonstration station up at the front with the same materials.
7. Demonstrate taking a pinch of powder and placing it in a cup.
8. Add 5 drops of liquid.
9. Observe the reaction that occurs and record the data.
10. Talk a little bit about the word reaction and what it means, for example, if there is a chemical reaction, "What might we see?" (fizz, color change, temperature change, etc.)
11. Record the reaction on Mystery Powder Lab Sheet (enlarged).
12. Explain that students must test every combination on the chart. After every test has been completed and recorded, students will look at the data and infer the

identity of the mystery powder. Students must use evidence from the experiments to support their inference.

13. Send students to stations.

Explain **(15 minutes) Identify a substance based on a chemical property**

14. After students have finished their experiments, call the class back for a discussion.

15. Complete the enlarged Mystery Powders lab paper to compile what each of the groups found.

16. Revisit the idea of identifying substances based on their chemical properties.

Extend **(10 minutes) Identify a substance based on a chemical property**

17. Repeat the experiment, but use potato flour. Have students discuss how the potato starch chemically reacted with the iodine solution.

Evaluate **(10 minutes) Identify a substance based on a chemical property**

18. Have students complete their exit card by responding to the following prompts:
What is a physical property? Give an example. What is a chemical property? Give an example. How do you know that there has been a chemical reaction when you mix baking soda and vinegar?



Name _____

Mystery Powders!

Powder	Water	Vinegar	Iodine Solution
Baking Powder			
Baking Soda			
Cornstarch			
Baby Powder			

	Water	Vinegar	Iodine Solution
Mystery Powder			

I think the mystery powder is a mixture of _____ and _____
because _____

_____.

Name: _____



1. What is a physical property? Give an example.
2. What is a chemical property? Give an example.
3. How do you know that there has been a chemical reaction when you mix baking soda and vinegar together?

Name: _____



1. What is a physical property? Give an example.
2. What is a chemical property? Give an example.
3. How do you know that there has been a chemical reaction when you mix baking soda and vinegar together?