EXPERIMENT

PROOF IS IN THE POWDER

"... We balance probabilities and choose the most likely. It is the scientific use of the imagination..."

—Sherlock Holmes, *The Hound of the Baskervilles*

What's Going On?

You have just done what most professionals do when they are trying to find out what an unknown powder is. If a powder is found at a crime scene and believed to have something do with the crime, police will send a sample to a lab. The lab will test the powder in many ways and see how it reacts. Then, the lab professionals will compare their observations with a list of known powders that react the same way. Not too much different than what you did, right?

Sherlock Holmes had to identify many unknown chemicals in the course of his adventures, just like modern day labs that work with unknown compounds and chemicals. Keep doing these kinds of investigations, and you will be well on your way to becoming a detective of your own!

The PROOF *is in the* POWDER

"In my profession all sorts of odd knowledge comes useful..."

—Sherlock Holmes, *The Adventure of the Three Garridebs*

Sherlock Holmes is an intrepid experimenter—but not always a wise one. In Conan Doyle's stories, Sherlock tastes strange chemicals from crime scenes, handles deadly poisons, and occasionally experiments on himself! Modern scientists consider these methods most unwise. If Sherlock lived today, he wouldn't need to take such dangerous risks, since

NEW TECHNIQUES

are now available to analyze unknown samples using methods other than taste. This activity will guide you through collecting data from known powders in order to identify a mystery powder.

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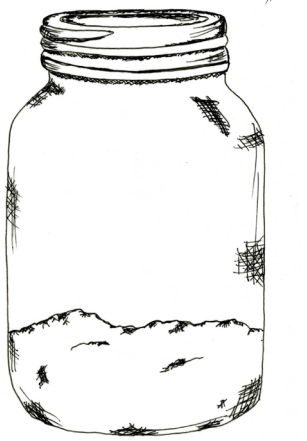
Materials

- ☐ Baking soda
- ☐ Baking powder
- ☐ Cornstarch
- ☐ Powdered sugar
- ☐ Flour
- ☐ Tongs
- ☐ Cup
- ☐ Iodine
- ☐ Vinegar
- ☐ Aluminum foil
- ☐ Ice cube tray
- ☐ Toothpicks
- ☐ Candle
- ☐ Spoons



Before You Begin

Ask a friend or adult to choose one of the five powders to be the mystery powder; make sure you do not know which powder he or she chose. Instruct your helper to place a small scoop of the mystery powder in a cup or jar. Your job, as the mystery solver, is to determine the identity of this unknown powder.

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Procedure

1. Four tests are listed below. You can conduct any test, on any powder, in any order. Your goal is to record information about each powder so that it can be used to identify the mystery powder.

   Water Test:
   Add one spoonful of water to a cup. Feel the outside of the cup. Add ½ spoonful of powder to the water. Mix with a spoon. Feel the cup now. Did the temperature change? Does the powder dissolve?

   Vinegar Test:
   Add ½ spoonful of vinegar and a pea-sized scoop of the powder into an ice cube well and mix it with a toothpick. What happens?

   Iodine Test:
   Add 3-4 drops of iodine and a pea-sized scoop of the powder into an ice cube well and mix it with a toothpick. What happens?

   Heat Test:
   Wrap a pea-sized amount of the powder in a piece of aluminum foil. Use tongs to hold the foil packet over a candle flame for 20 seconds. Unwrap the packet and look at the powder. Be careful- the foil will be hot! What happens?

2. Now it is time to test the mystery powder! You do not know what it is, so you will have to do the same four tests to see how this powder reacts.
3. Compare your data! Which of the five powders does the mystery powder most closely resemble?