

MYSTERY POWDERS

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Objective

The object of this investigation is to identify unknown substances using the senses to make observations and other materials to make logical inferences.

Safety

Although the substances used in this investigation are not harmful, the following safety precautions should be observed.

1. **Cautiously** note any odors of the substances when directed to do so.
2. Wash your hands after handling the substances. Do not handle the liquids.
3. **Do not taste any substances.** There is no way to guarantee the purity of any of the white solids used in this experiment. Do not taste any of the liquid substances under any circumstances.

Materials needed

1 set of white powders in 2 oz (60 mL) square, clear, screw-top bottles. Bottles are labeled 1 to 4.

1 set of solutions in 2 oz (60 mL) square, clear, dropper bottles. Bottles are labeled W, V and I.

Popsicle sticks

Disposable Petri dishes, 2 per group

After you have finished the initial testing:

2 unknown mixtures in 2 oz (60 mL) square, clear, screw-top bottles. Bottles are labeled 5, 6, 7, or 8.

Disposal

All waste powders can safely be disposed of in the trash.

All waste solutions can safely be disposed of down the drain with running water.

The Petri dishes can be reused. Wash them and place them in the designated area in the laboratory.

Procedure

1. Observations: Use of the senses

The object of this part of the experiment is to observe some of the physical properties of the four powders as provided by the physical senses. The properties being observed are:

Sight: color and crystalline form.

Smell: odor

Touch: relative hardness and some evidence of crystalline form.

Using clean popsicle sticks for each substance, put a small amount of each powder in a separate area of the Petri dish.

Note the color, odor, crystalline form, and relative hardness of each of the four solids. Record your results in Table 1.

2. Observations: Use of Additional Substances

This part of the experiment deals with solubility (a physical property) and with some chemical properties of each substance.

Place three small piles of each powder in a half of a Petri dish. Add one or two drops of liquid W to one pile, one or two drops of liquid V to another pile, and one or two drops of liquid I to the third pile. Record your results in Table 2.

3. Identification of Mixtures

Using the properties of the four powders, as determined in the first two parts of this investigation, determine the identity of the components in two of the mixtures labeled 5, 6, 7, or 8. Record your results in Table 3.

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DATA and RESULTS

Names: _____ Date: _____

Table 1. Results of sensual observations of the powders.

Property	Bottle #1	Bottle #2	Bottle #3	Bottle #4
Color				
Crystalline form				
Odor				
Hardness				

Table 2. Results of interactions of liquids with the powders.

Liquid	Bottle #1	Bottle #2	Bottle #3	Bottle #4
W				
V				
I				

Table 3. Results of investigations of the mixtures.

Property	Bottle # _____	Bottle # _____	Bottle # _____	Bottle # _____
Color/appearance				
Touch/Crystalline form				
Odor				
Reaction with liquid W				
Reaction with liquid V				
Reaction with liquid I				

What is the composition of each unknown mixture you tested?

Unknown # _____ Composition _____

Unknown # _____ Composition _____

Unknown # _____ Composition _____

Unknown # _____ Composition _____