

Materials & Equipment


- salt, baking soda, corn starch, sodium nitrate, sodium thiosulfate
- black paper
- hand lens
- water
- 5% acetic acid or 5% hydrochloric acid 
- iodine solution
- wax paper or spot plate
- disposal containers



Figure 1.8 Step 7

IDENTIFYING MYSTERY SUBSTANCES**The Question**

How can the properties of a substance be used to identify it?

Procedure*Part 1—Examining Five Substances*

- 1 Copy the table shown on the next page into your notebook.
- 2 Collect five substances from your teacher.
- 3 Perform the tests described below to identify the properties of the substances. You do not have to do the tests in the order shown below, but you must do all of them.
- 4 Make sure the data table is completely filled in before you begin part 2 of the activity.

Test 1—Appearance


- 5 Use one sheet of black paper for all your samples. Place a small amount of each powder in different places on the same sheet of black paper. Make sure that your powder samples are not touching each other.
- 6 Describe the appearance of each powder. Record your observations in the data table.

Test 2—Crystal shape

- 7 Use a hand lens or microscope to examine the grains of each powder. Record your observations in the data table.
- 8 Dispose of the powders and the black paper in the container provided.

Test 3—Behaviour in water

- 9 Use one large sheet of wax paper or a spot plate for all your samples. Place a small amount of each powder on the wax paper or spot plate.
- 10 Add a drop of water to each powder. Record your observations in the data table.
- 11 Dispose of the powders and the wax paper in the container provided. Clean the spot plate.

Test 4—Behaviour in acid   

- 12 Place a small amount of each powder on a new sheet of wax paper or a clean spot plate.
- 13 Add a drop of 5% acetic acid solution or 5% hydrochloric acid solution to each powder. Record your observations in the data table.
- 14 Dispose of the powders and the wax paper in the container provided. Clean the spot plate.

Test 5—Behaviour in iodine   

- 15 Place a small amount of each powder on a new sheet of wax paper or a clean spot plate.
- 16 Add a drop of iodine solution to each powder. Record your observations in the data table.
- 17 Dispose of the powders and the wax paper in the container provided. Clean the spot plate thoroughly.

Part 2—Identifying Unknown Substances



- 18 Collect an unknown sample from your teacher. Record the letter or number of the sample in the data table next to the word “unknown.”
- 19 Determine the properties of the unknown sample by repeating the five tests above, and record your observations in the data table.

Analyzing and Interpreting

- 20 For each substance, one or two tests clearly identified it as being unique from the other substances. What were those tests for each of the white powders?
- 21 Were some tests more useful than others? Explain your answer.
- 22 Were the results of some of the tests confusing? Explain your answer.
- 23 What substance or substances were in your unknown sample?

Forming Conclusions

- 24 Describe how you inferred what substance or substances were in your unknown sample. Use your data to support your conclusions.

Applying and Connecting

Knowing the properties of a substance is essential to finding practical uses for it. For example, corn starch can be used to make glue. If corn starch is cooked with an acid, a sticky, adhesive substance is produced. A similar substance can be produced from the solid materials that form after acid is added to milk. This substance is called *casein*. Casein can be mixed with a basic solution to form a strong glue.

Substance	State	Appearance	Crystal Shape	Behaviour in Water	Behaviour in Acid	Behaviour in Iodine
salt						
baking soda						
corn starch						
sodium nitrate						
sodium thiosulfate						
unknown						