

Unit 1 Matter and Qualitative Analysis

1.1

Activity

Identifying a Mystery Powder

Physical properties are properties of a substance that can be observed, such as colour, texture, hardness, melting point, conductivity, and odour. *Chemical properties* are properties of a substance that describe how the substance reacts with other chemicals. Physical and chemical properties are unique to each type of matter. Therefore, you can identify a substance by investigating its physical and chemical properties and then comparing these properties to properties you have already identified. This process is known as *qualitative analysis*.

To identify the mystery powder in this activity successfully, it is important that you make detailed observations. Be very descriptive when completing **Tables 1, 2, and 3**. Note any colour change, the production of any new substance, the texture of each powder, and the size of the granules, if applicable.

Question

What is the identity of the mystery powder?

Observations

Describe the appearance of each of the six powders in **Table 1**.

Table 1 Observations of Physical Properties

Powder	Appearance
1	
2	
3	
4	
5	
6	

Complete steps 3 to 7 of the Procedure, and then complete **Table 2**.

Table 2 Observations of Chemical Properties

Powder	1	2	3	4	5	6
Water						
Universal indicator						
HCl _(aq)						
Fe(NO ₃) _{3(aq)}						
I _{2(aq)}						

Evaluation

- (f) How confident are you in your answer to the Question? Justify your level of confidence using evidence from this activity.

- (g) Describe additional tests that you could perform to increase your level of confidence in your answer.

- (h) Suggest sources of error and changes to the Procedure that would help to reduce these sources of error.

- (i) In your own words, explain why the qualitative analysis of matter plays an important role in forensic science.

Extension

- (j) Forensic scientists compare their analyses to existing knowledge. In the United States, the FBI works closely with pharmaceutical companies to produce tests for identifying all new drugs that become available to the public. Explain how this activity, or simulation, is similar to the steps that a forensic scientist takes to identify a substance, and how it is different.

Complete step 8, and then record your observations in **Table 3**.

Table 3 Observations of Mystery Powder

Test	Results

Describe the appearance of the mystery powder.

Analysis

- (a) Analyze your observations, and then answer the Question.

Sample # _____ is _____.

- (b) List the physical properties of the six samples that helped you identify the mystery powder.

Physical evidence to support my conclusion is _____

- (c) List the chemical properties of the six samples that helped you identify the mystery powder.

Chemical evidence to support my conclusion is _____

- (d) Why was it important to test the six samples before identifying the mystery powder?

- (e) What kind of analysis did you perform in this activity? Justify your answer.