

Identifying a Mystery Mineral

Students are presented with the problem of identifying a mystery mineral sample. To solve this problem, they must apply their knowledge of mineral properties and the tests used for each property. Once the properties of the mineral are determined, students can then identify the mineral using the table in Appendix B, Identifying Common Minerals.

◆ Expected Outcome

Students should be able to identify the mineral sample through observation and some simple tests. Through observation, they can determine the color and luster of the sample. With the materials provided for a scratch test, they can roughly determine the sample's hardness. With the streak plate, they can observe the color of the sample's streak. By hefting the sample, students can make a relative determination of the sample's density. Through observation of the minerals exterior, students can make a judgment about whether the sample has cleavage or fracture. Once these properties have been determined, students can identify the sample using Appendix B.

◆ Content Assessed

This activity assesses students' knowledge of mineral properties and the tests used to identify minerals.

◆ Skills Assessed

observing, applying concepts, drawing conclusions

◆ Materials

- ◆ Mineral samples should be ones that appear in the table in Appendix B, Identifying Common Minerals.
- ◆ Mystery mineral samples might include pyrite, galena, olivine, hornblende, feldspar, quartz, talc, hematite, or others on the table. Assign mineral samples to students arbitrarily.

- ◆ The back of a ceramic tile makes a good streak plate.
- ◆ Any heavy piece of glass will do for the scratch test. For safety reasons, a baby-food jar is useful because it doesn't break easily.
- ◆ A steel knife can be used in place of the metal nail file.

◆ Advance Preparation

- ◆ Gather enough materials for each student a day in advance.

◆ Time

20 minutes

◆ Safety

Caution students that they will be working with a metal nail file that can cause a cut or abrasion if mishandled. Caution them that they will be using glass jars that are breakable. Instruct them to wear safety goggles and to handle the jars with care. Tell students that if glass does break, they should notify you immediately and not touch the broken pieces.

◆ Monitoring the Task

- ◆ Review each student's list of tests they can do to identify the sample.
- ◆ Suggest that students make a list of properties used to identify a mineral and then try to figure out how to determine each property in the sample.



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In assessing students' performance, use the following rubric.

	4	3	2	1
Mineral Identification	The student correctly identifies the mystery mineral using evidence of six properties, including hardness, color, streak, luster, density (heft), and cleavage/fracture.	The student correctly identifies the mystery mineral using evidence of four to five properties.	The student correctly identifies the mystery mineral using evidence of two to three properties or misidentifies the mineral despite using evidence of three to five properties.	The student incorrectly identifies the mystery mineral using evidence of one or two properties.
Concept Understanding	The student demonstrates a mastery of the concepts related to the characteristics of a mineral and the properties used for mineral identification.	The student demonstrates an adequate understanding of the concepts related to the characteristics of a mineral and the properties used for mineral identification.	The student demonstrates some understanding of the concepts related to the characteristics of a mineral and the properties used for mineral identification.	The student demonstrates a weak understanding of the concepts related to the characteristics of a mineral and the properties used for mineral identification.



PERFORMANCE ASSESSMENT

Identifying a Mystery Mineral

◆ Problem

How can you identify a mineral sample from its properties?

◆ Suggested Materials

mystery mineral sample
streak plate
metal nail file
penny
glass baby-food jar
scrap piece of metal
Mohs hardness scale
Appendix B

◆ Devise a Plan

1. Study the materials and think of a way you could use them to identify the mystery mineral sample.
2. Make a list of the tests you can make to identify the mystery mineral.
3. Keep a record of the results of all tests you carry out.

◆ Analyze and Conclude

Respond to the following items on a separate sheet of paper.

1. What are the characteristics that a substance needs to have to be considered a mineral?
2. What characteristic of minerals gives each mineral its own specific properties?
3. What tests did you carry out to identify the mineral sample? Give a reason why you carried out each test.
4. Which property or properties could you not test for? Why?
5. Identify the mystery mineral, and give as many reasons as possible for your identification.

