Identifying Minerals

In this investigation, you will identify several different minerals by examining some of the properties you have just learned about (Figure 1). Geologists use these properties, as well as others, to identify minerals.

Figure 1
Hardness tests can be used to help identify unknown minerals.

Question
Can you identify unknown minerals by their properties?

Materials
- safety goggles
- apron
- set of numbered mineral samples
- Mohs hardness scale set of minerals (or substitutes)
- hand lens
- streak plate (unglazed tile)
- magnet
- dropper
- vinegar
- hammer
### Procedure

1. Copy the table below into your notebook.

<table>
<thead>
<tr>
<th>Mineral number</th>
<th>Colour</th>
<th>Streak</th>
<th>Lustre</th>
<th>Hardness</th>
<th>Magnetism Reaction with vinegar</th>
<th>Cleavage</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>grey-black</td>
<td>reddish</td>
<td>metallic</td>
<td>brown</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Select a mineral from the set your teacher provides. Record the number of the mineral in the first column of your table.

3. **Colour:** What colour is your mineral? Record the colour of your mineral in your table.

4. **Streak:** Rub your mineral across the streak plate. Brush off the extra powder with your fingers. Record the colour of the streak, if any.

5. **Lustre:** Is the lustre of your mineral metallic (like polished metal) or non-metallic? Is it brilliant, glassy, pearly, silky, waxy, or dull? Try to find the best words to describe the lustre of your mineral, and record your observations.

6. **Hardness:** Scratch your mineral with Mohs mineral #5 (or a nail). If this does not leave a scratch or groove in your mineral, continue along the scale toward #10. If mineral #5 does leave a scratch in your mineral, move along the scale toward #1. Rank the hardness of your mineral. (It will be between two numbers unless your mineral is identical to one of the minerals in the Mohs hardness scale.) Record your results.

7. **Magnetism:** Use a magnet to determine if your mineral is magnetic. Record your result.

8. **Reaction with vinegar:** Use the dropper to put a few drops of vinegar on your mineral. Does it fizz? Record your results.

9. **Cleavage:** Your teacher will use a hammer to break your mineral. Does it break along flat surfaces, or does it break into pieces with rough, uneven surfaces? Record your observations.

10. Repeat steps 2 to 9 for the rest of the minerals in your set.

**Wear safety goggles during step 9.**
11 Use Table 2 to help you identify your minerals. If you can identify a mineral, write its name in the last column of your data table. If you cannot identify a mineral, write “do not know.”

**Table 2** Characteristics of Some Common Minerals

<table>
<thead>
<tr>
<th>Mineral</th>
<th>Colour</th>
<th>Streak</th>
<th>Lustre</th>
<th>Hardness</th>
<th>Magnetism</th>
<th>Reaction with acid</th>
<th>Cleavage</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>graphite</td>
<td>black</td>
<td>black</td>
<td>metallic</td>
<td>1–2</td>
<td></td>
<td></td>
<td></td>
<td>slippery feel</td>
</tr>
<tr>
<td>galena</td>
<td>grey</td>
<td>grey</td>
<td>metallic</td>
<td>2–3</td>
<td></td>
<td></td>
<td></td>
<td>square corners</td>
</tr>
<tr>
<td>halite</td>
<td>white</td>
<td>colourless</td>
<td>glassy</td>
<td>2–3</td>
<td></td>
<td></td>
<td>three cleavage planes</td>
<td>square corners</td>
</tr>
<tr>
<td>biotite</td>
<td>black</td>
<td>white/pale grey</td>
<td>glassy/brilliant</td>
<td>2–3</td>
<td></td>
<td></td>
<td></td>
<td>splits into leaves; one cleavage plane</td>
</tr>
<tr>
<td>calcite</td>
<td>white</td>
<td>colourless</td>
<td>glassy</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>fizzes</td>
</tr>
<tr>
<td>pyrrhotite</td>
<td>yellow-brown</td>
<td>black</td>
<td>metallic</td>
<td>4</td>
<td>magnetic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>serpentine</td>
<td>shades of green</td>
<td>colourless</td>
<td>silky/waxy</td>
<td>2–5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>magnetite</td>
<td>black</td>
<td>black</td>
<td>metallic</td>
<td>6</td>
<td>magnetic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hematite</td>
<td>red/black</td>
<td>red</td>
<td>metallic/dull</td>
<td>5–7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>feldspar</td>
<td>white/pink/greenish</td>
<td>colourless</td>
<td>pearly</td>
<td>6</td>
<td></td>
<td></td>
<td>two cleavage planes</td>
<td></td>
</tr>
<tr>
<td>pyrite</td>
<td>yellow</td>
<td>brown/black</td>
<td>metallic</td>
<td>6–7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>quartz</td>
<td>colourless/white/rose</td>
<td>colourless</td>
<td>glassy</td>
<td>7</td>
<td></td>
<td></td>
<td>two reflective surfaces</td>
<td>will scratch glass</td>
</tr>
</tbody>
</table>
Analyze and Evaluate

1. Did lustre help you identify any of the minerals in your set? If so, which one(s)?

2. Do you think that streak is more useful for identifying minerals than colour or lustre? Explain your answer using an example.

3. Do you think that magnetism is a useful property for identifying minerals? Suggest a reason for your answer.

Apply and Extend

4. Which properties could you use to identify minerals if you were out for a walk and had no equipment?

CHECK YOUR UNDERSTANDING

1. Why is it important to wear safety goggles when investigating the cleavage of minerals?

2. Why do you think you were asked to record your observations and results in a table?