

Minerals: Building Blocks of Rocks

7.1

If you look carefully at rocks, you will soon see that they are not all the same. Some are white, and some black. Others are brightly coloured or have several different colours. One rock may be soft and dull, whereas another rock may be hard and shiny. An important step in learning how to understand rocks is finding ways to classify them into groups based on their properties. Properties are observable facts about a material, such as colour.

TRY THIS: OBSERVE ROCKS

Skills Focus: observing

Find two or three small, interesting-looking rocks in your schoolyard or at home. Each rock should have some features that make it different from the other(s). Examine and record the properties of your rocks.

1. Make a chart to organize the properties of rocks that you observe.



Properties	Rock 1	Rock 2	Rock 3
colour			

2. What colour(s) are the rocks?
3. Do they look the same throughout, or do they have different types of materials mixed together?
4. Do they feel heavy or light in comparison to their size?
5. Do they have pieces that sparkle or reflect light?
6. Which of your rocks is the hardest? How can you tell?
7. Do your rocks look like most other local rocks? If not, why do you think they are different? How do you think they got to where you found them?

All rocks are made of minerals.

Minerals are pure, naturally occurring substances that are found in Earth's crust. Do you know someone who wears a diamond ring? Diamonds come from rocks. The graphite in your pencil is a mineral (**Figure 1**). You can think of minerals as the “building blocks” of rocks.

Scientists who study, identify, and classify rocks are called geologists [gee-OL-o-gists]. On the next few pages, you will learn about some of the properties that geologists use to identify the minerals that make up rocks.

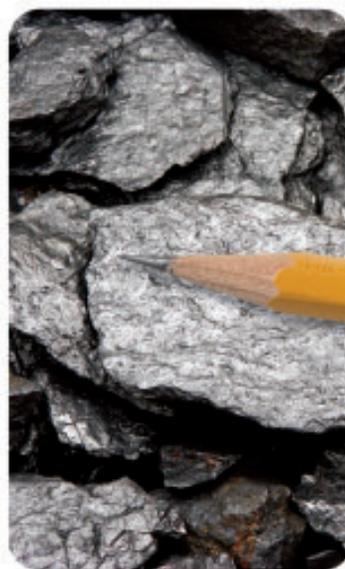


Figure 1
Graphite is used to make pencils.



▶ LEARNING TIP

Preview the next four pages. Each heading is a property. Under each heading, the property is explained and you are given examples in both words and photographs. Make notes using this structure.

Colour

Colour is easy to determine and can be an important clue to a mineral's identity (**Figure 2**). By itself, however, colour is not a reliable way to identify minerals. Different minerals may be the same colour. For example, both gold and pyrite (fool's gold) are yellow. Some minerals occur in many different colours. For example, quartz is often white, but it can also be violet, gray, black, or colourless (**Figure 3**).



Figure 2
Jade is usually a shade of green

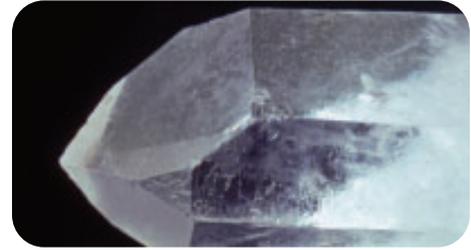


Figure 3
Quartz is sometimes colourless.

Streak

Streak describes the colour of the powdery mark that some minerals make when they are scratched against a hard surface. To see the streak clearly, geologists scratch a mineral on a streak plate. A streak plate is an unpolished piece of porcelain tile. The colour of the streak may be the same as the colour of the mineral, or it may be different. The colour of the streak is more reliable than the colour of the mineral. For this reason, it is very useful for identifying some minerals. For example, hematite can be shiny silver or reddish, but it always has a reddish streak (**Figure 4**). Pyrite (fool's gold) and gold are both yellow, but gold makes a yellow streak and pyrite makes a dark streak (**Figure 5**).



Figure 4
Different colours of hematite make the same colour streak.



Figure 5
During the gold rush, prospectors used streak to test if they had found real gold.

Lustre

Lustre [LUST-er] is the degree of shininess. Some minerals, such as gold, have a metallic lustre (Figure 6). Others, such as obsidian, look glassy (Figure 7). Still others, such as asbestos, have a dull appearance (Figure 8).

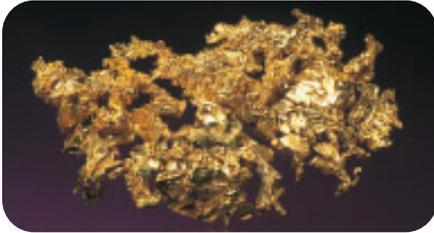


Figure 6
Gold has a metallic lustre.

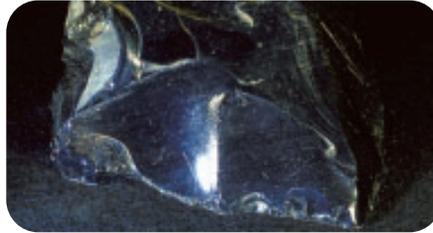


Figure 7
Obsidian has a glassy lustre.

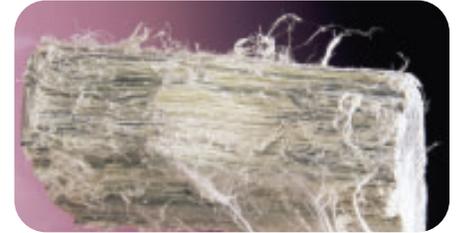


Figure 8
Asbestos has a low lustre.

Hardness

The hardness of a mineral can be determined by scratching one mineral against another. A mineral can make a scratch on any mineral that is softer than it is, but it cannot make a scratch on a mineral that is harder than it is. Geologists use a set of 10 standard minerals, ranging from very soft to very hard, to compare hardness. This is called the Mohs hardness scale (Table 1) after Friedrich Mohs (1773–1839), the German scientist who developed it. If you cannot obtain a set of Mohs hardness scale minerals, you can make your own using everyday materials.

Table 1 Scale for Comparing the Hardness of Minerals

Mohs hardness scale	Hardness scale of materials you can easily find
1 talc <i>SOFTTEST</i>	1 soft pencil point
2 gypsum	2–3 fingernail
3 calcite	3–4 copper penny
4 fluorite	5–6 nail or glass bottle
5 apatite	6–7 steel file
6 feldspar	7–8 sandpaper
7 quartz	9 emery paper
8 topaz	
9 corundum	
10 diamond <i>HARDEST</i>	



Crystal Structure

All minerals are crystals (**Figures 9 and 10**). Crystals have regular shapes because they are made up of tiny particles that are connected in a repeating pattern. The size of the crystals tells geologists how quickly a mineral cooled from a liquid to a solid. Large crystals indicate that the mineral cooled slowly. Small crystals indicate that the mineral cooled rapidly. Most crystals are too small to be seen without magnification.



Figure 9
Crystals of wulfenite



Figure 10
Crystals of pyrite

Cleavage

Some minerals break, or fracture, into pieces with rough, uneven surfaces. Quartz breaks in this way. Other minerals usually split or crack along parallel or flat surfaces. This property is called cleavage. You can test a mineral by breaking it with a hammer or splitting off sheets with a dinner knife. For example, mica (**Figure 11**) always splits into thin sheets. Other minerals, such as halite (**Figure 12**), always split into cubes.

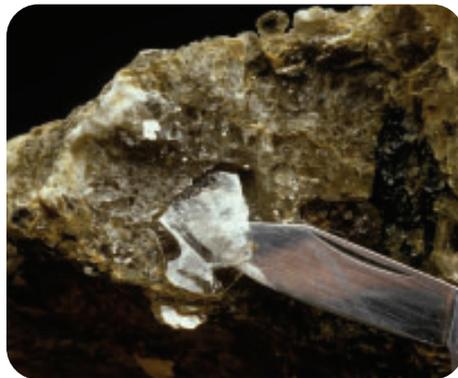


Figure 11
Mica



Figure 12
Halite (also called table salt)

Magnetism

Magnetism is the ability of a mineral to attract a magnet. Only minerals that contain iron are magnetic, so most minerals are not magnetic. You can use a magnet to find out if a mineral is magnetic (**Figure 13**).



Figure 13

Magnetite will attract or repel a magnet.

Reaction with Certain Chemicals

Some minerals can be identified by their reaction with certain chemicals. For example, calcite, limestone, and marble react with acidic solutions, such as vinegar (**Figure 14**). The acidic vinegar reacts with the carbonate materials in these minerals, creating a fizzing or bubbling on the surface. The gas that fizzes or bubbles up is carbon dioxide.



Figure 14

Limestone fizzes as it reacts with vinegar.

CHECK YOUR UNDERSTANDING

1. List the eight properties that are used to classify minerals.
2. What is one advantage of using colour to identify a mineral? What is one disadvantage of using colour to identify a mineral?
3. Why do geologists use both the colour of a mineral and the colour of its streak to identify the mineral?
4. Why do you think geologists use drill bits covered with small diamonds to drill into Earth's crust?

LEARNING TIP

Do not guess. Look back through the section to find the answers. Even if you remember the answer, it is good to go back and check it.