

Name:

Science

Lesson 37 8th - NTI Day 8

Properties of Rocks and Minerals

How can we tell different minerals apart? A **mineral** is a naturally existing solid substance that has a specific structure and composition. Scientists have a variety of physical attributes they use to distinguish between different rocks and minerals. These characteristics include color, hardness, the color of their streak, how transparent they are, their luster, the way they break or cleave, how they fracture, their specific gravity, and their crystal form or structure. The **formation process** of a mineral dictates its properties.

Rocks can be made up of one or many minerals. Since it's common for rocks to comprise different minerals, it can be quite challenging to differentiate them. However, the types of minerals present in a rock can give us clues. Granite, for instance, is composed of minerals such as feldspar, mica, hornblende, and quartz.

Color is often the first property we notice when identifying rocks. Some minerals always have the same color, which simplifies their identification. For example, malachite is always green. But, certain rocks, like quartz, can undergo chemical changes that alter their color. When pure, quartz is clear, but when iron traces are present, it transforms into a purple color known as amethyst.

The **hardness** of rocks is classified using the *Mohs' Hardness Scale*, as displayed in the diagram on the right. You can test the hardness of a mineral by trying to scratch it with another mineral. A harder mineral will scratch a softer one. This principle was used by Friedrich Mohs, a German mineralogist, in 1822 to develop a scale of hardness. The Mohs' Hardness Scale ranks ten minerals from the softest to the hardest, with one being the softest and ten the hardest.

Mineral Hardness

Mohs' Hardness Scale		Approx. Hardness of Common Objects
Talc	1	
Gypsum	2	Fingernail (2.5)
Calcite	3	Copper Penny (3.5)
Fluorite	4	Iron Nail (4.5)
Apatite	5	Glass (5.5)
Feldspar	6	Steel File (6.5)
Quartz	7	Streak Plate (7.0)
Topaz	8	
Corundum	9	
Diamond	10	

The **streak** of a mineral refers to its color when it's rubbed across a white porcelain tile that isn't glazed. It can also be determined by grinding the mineral into a powder. Interestingly, quartz, whether it's a purple amethyst, a pink rose quartz, or a brown smoky quartz, will always leave a white streak.

The **transparency** property describes the extent to which a mineral allows light to pass through. There are three levels of transparency: **transparent**, **translucent**, and **opaque**. Transparent minerals let you see through them. Some light can pass through translucent minerals, but you can't see through them. No light can pass through an opaque mineral.

Luster, another property, is the way a mineral reflects light. It can appear shiny, dull, silky, or glassy. This property should be observed on a freshly cut piece of rock.

The way a mineral breaks can be either by cleavage or fracture. This can happen in two or more directions. Some common forms include cubic, rhombohedral (six-sided prism), and basal (along a plane parallel to the mineral's base) cleavages. Not all minerals cleave easily, some fracture. Fractures can take forms such as conchoidal (a shell-like fracture with a smooth, curved surface), fibrous or splintery, rough or jagged, and uneven or irregular.

Specific gravity measures a mineral's **density**. Even if minerals are of the same size, some are heavier than others.

The **structure** or **crystal form** of minerals is another distinguishing factor. This refers to the arrangement of the rock's molecules. It could belong to one of six crystal system forms or seem like large pieces or sections are bonded together.

When trying to identify rocks, a rock field guide can be a very helpful tool. It allows you to compare the physical properties of various rocks and minerals.

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Lesson 37

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Properties of Rocks and Minerals

1. What is a mineral?

- A. A type of animal
- B. A type of plant
- C. A naturally existing solid substance with a specific structure and composition
- D. A type of cloud

2. What mineral is always green?

- A. Amethyst
- B. Quartz
- C. Feldspar
- D. Malachite

3. What is the name of the scale used to measure the hardness of minerals?

- A. The Rock Hardness Scale
- B. The Geologist's Scale
- C. The Mohs' Hardness Scale
- D. The Mineral Hardness Scale

4. What property describes how well light passes through a mineral?

- A. Transparency
- B. Luster
- C. Hardness
- D. Streak

5. What color streak does quartz leave?

- A. Black
- B. Red
- C. Green
- D. White

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Lesson 37

Properties of Rocks and Minerals

6. What type of mineral reflects light in a shiny, dull, silky, or glassy way?
- A. Hardness
 - B. Luster
 - C. Color
 - D. Transparency
7. What property describes the way a mineral breaks?
- A. Cleavage or fracture
 - B. Luster
 - C. Transparency
 - D. Streak
8. What does specific gravity measure in a mineral?
- A. The size of the mineral
 - B. The color of the mineral
 - C. The density of the mineral
 - D. The hardness of the mineral
9. What does the crystal form of a mineral refer to?
- A. The color of the mineral
 - B. The way the mineral breaks
 - C. The arrangement of the rock's molecules
 - D. The hardness of the mineral
10. What tool is useful to have when identifying rocks?
- A. A microscope
 - B. A telescope
 - C. A rock field guide
 - D. A stethoscope