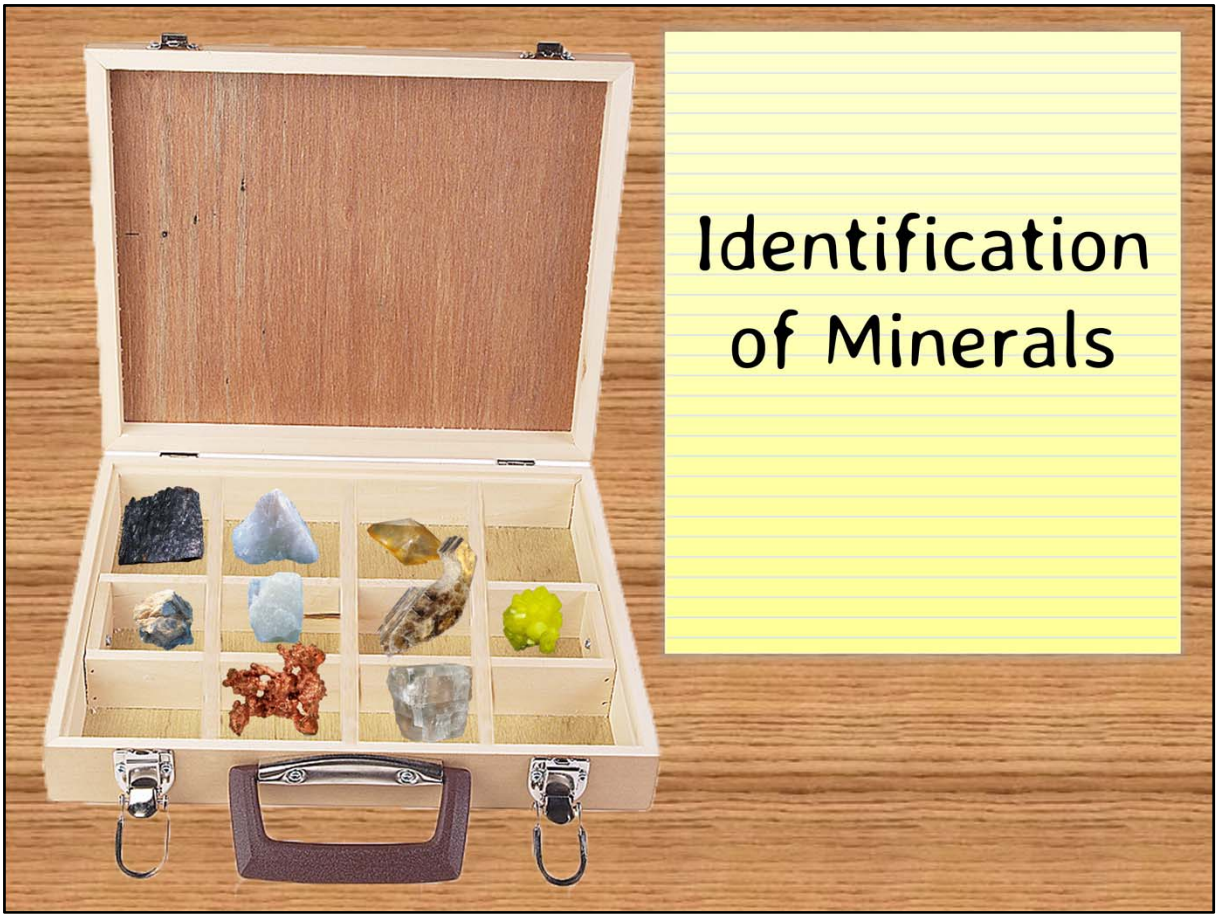
# Module 5: Minerals

## Topic 3 Content: Identification of a Mineral Presentation Notes




Identification of Minerals

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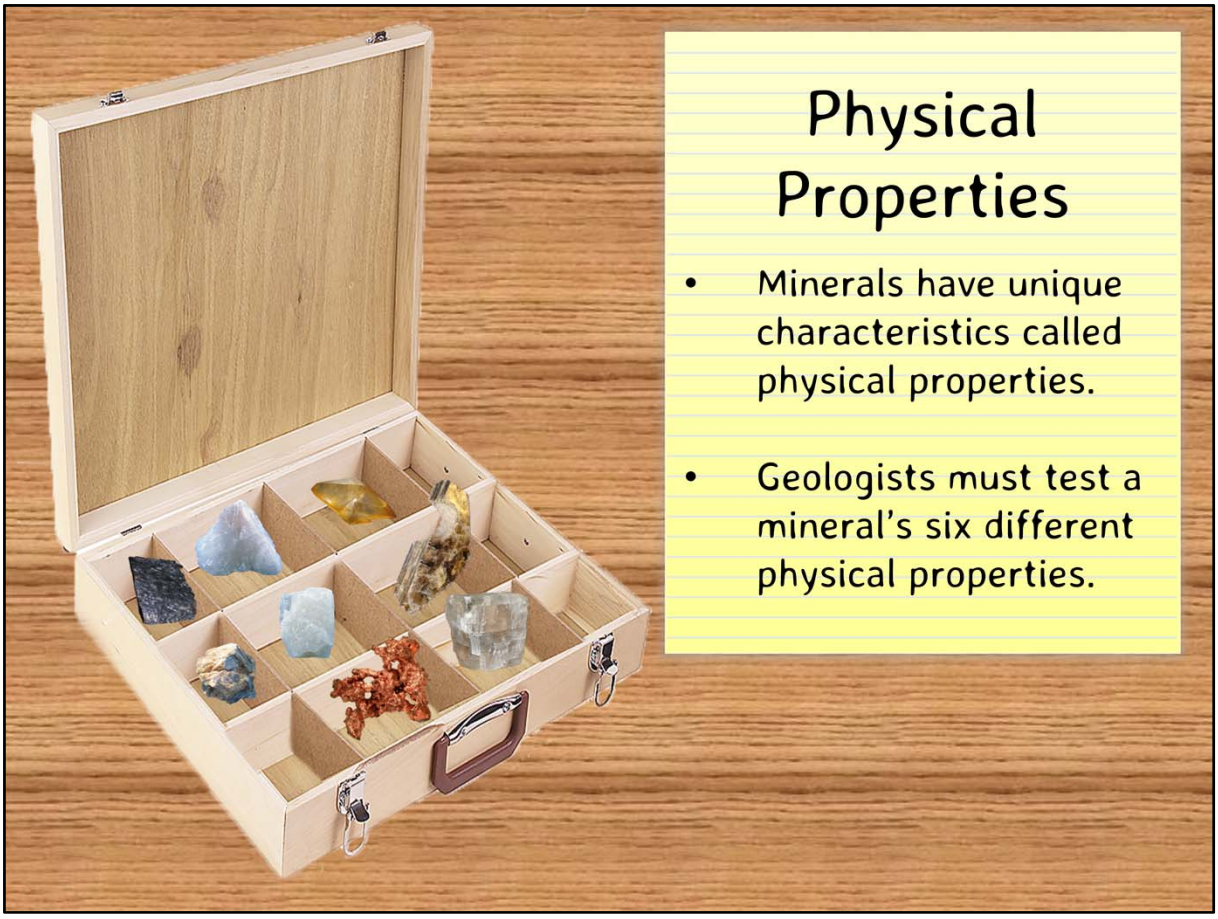


Minerals occur in different colors, sizes, and shapes. Minerals also differ in the way that they reflect light and in the way that they break. Some minerals are softer than others, and some minerals are even magnetic. Every one of the thousands of minerals on Earth has its own unique set of characteristics. These characteristics are known as physical properties. In order to correctly identify a mineral, geologists must observe and test six different physical properties. The results of each test are compiled, and the mineral can then be confidently identified.

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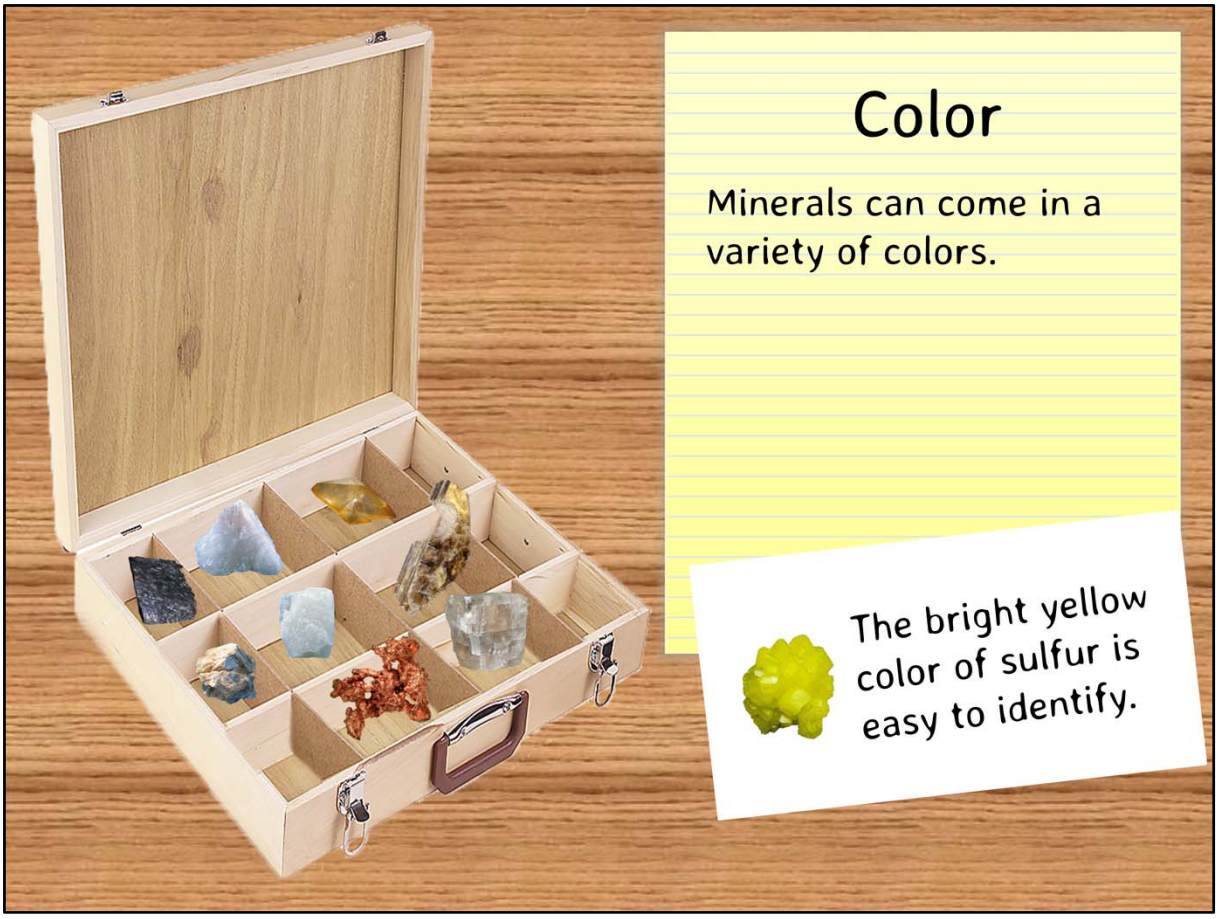


Color is the easiest physical property to identify, but it is the least reliable in identifying minerals. Minerals can come in a variety of colors. That is why color is only one factor of many that helps identify minerals. Sulfur is one of the easiest minerals to identify by color, since it is bright yellow.

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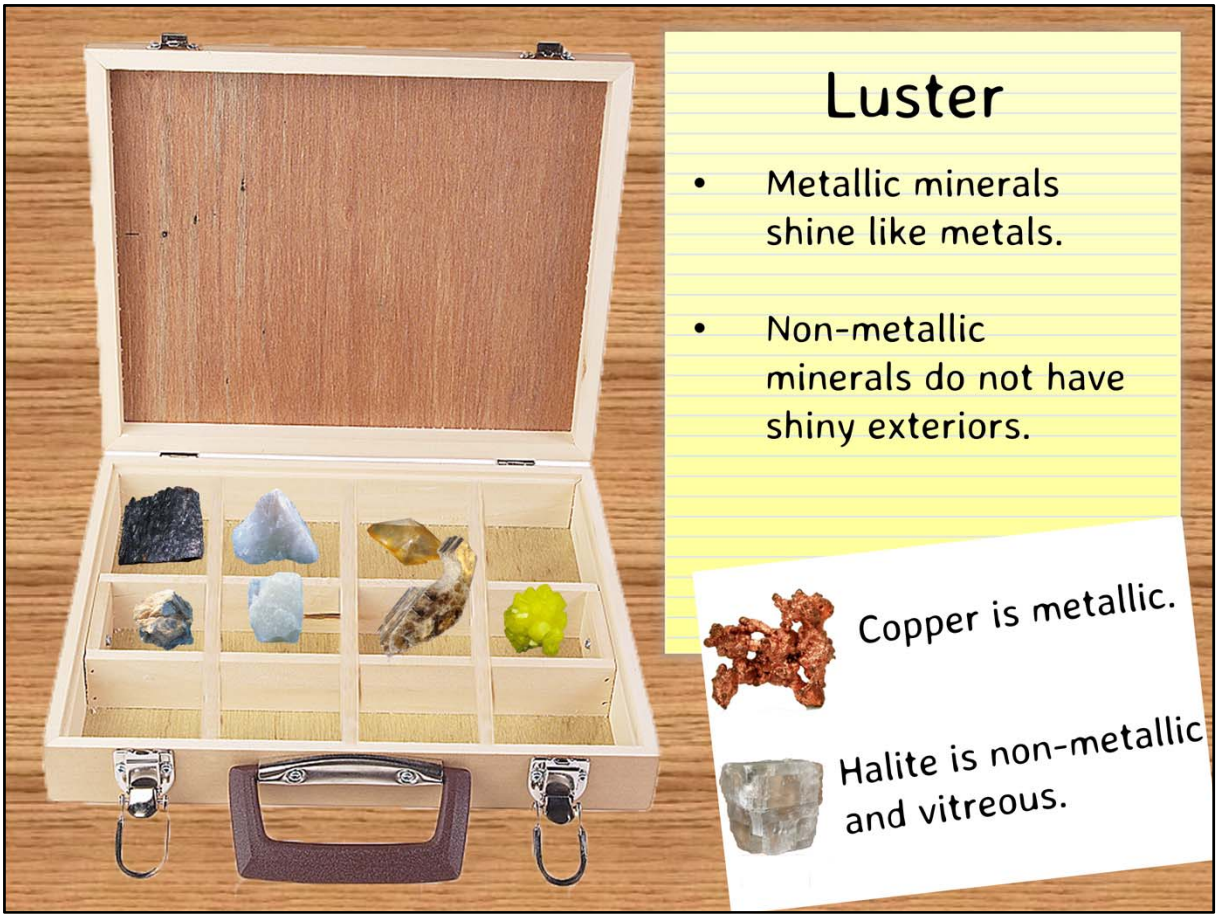


Luster, or the way a mineral reflects light, is another physical property of minerals. Minerals are considered metallic when they look like, or reflect light, like a metal. Metallic minerals are often shiny. A non-metallic mineral does not reflect light as a metal does, and does not have a shiny exterior. Minerals with a non-metallic luster are described by many other adjectives. Non-metallic minerals can be described as vitreous or glassy, pearly, silky, and earthy. Some non-metallic minerals can have an adamantine, or brilliant, luster. In this example, copper has a metallic luster. This mineral shines much like a metal. Halite has a non-metallic luster. Halite appears much like glass and can be further described as vitreous.

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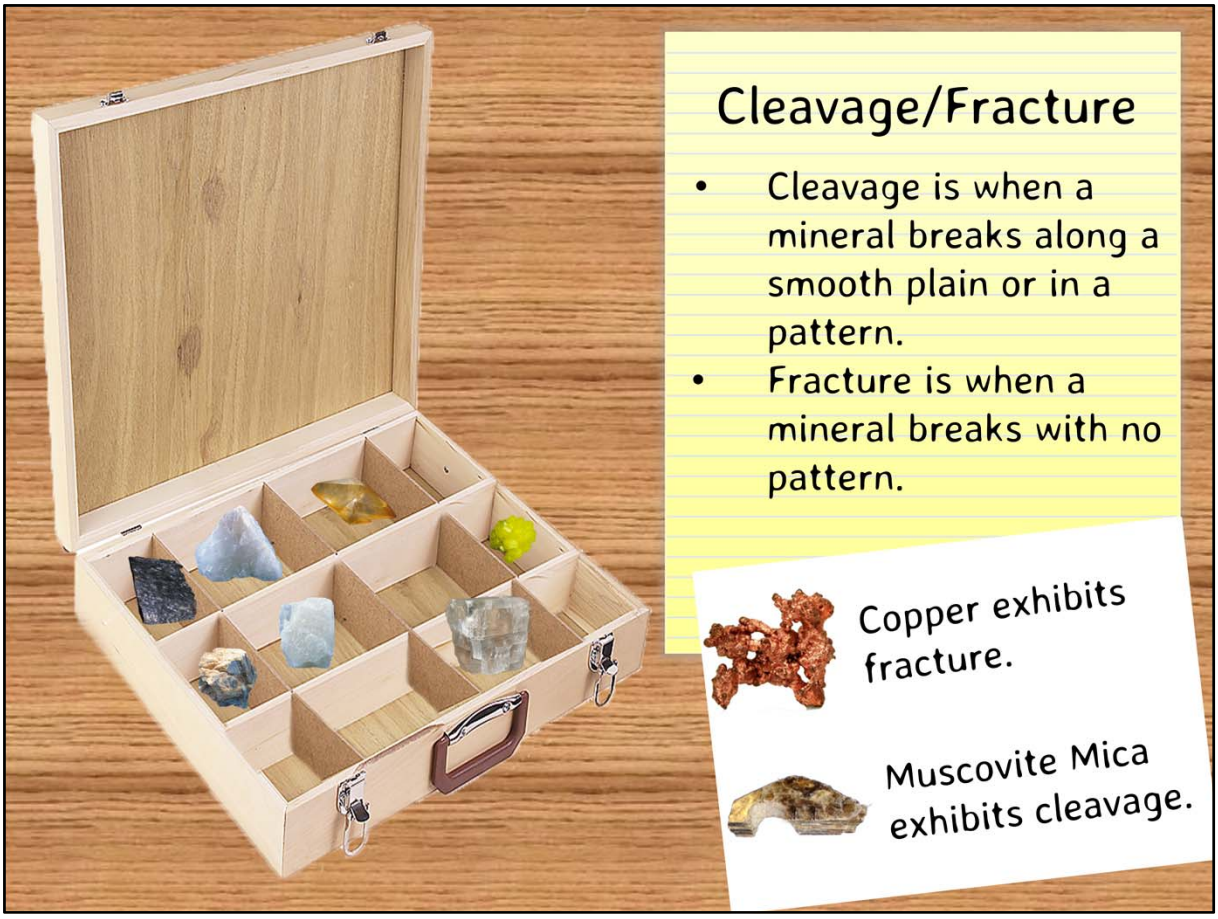


Different types of atomic bonds break in different patterns. The way a mineral breaks into pieces is a result of how the atoms in that mineral are arranged. There are two different categories of breakage. Cleavage is when a mineral breaks along a smooth plain or in a particular pattern. Some minerals cleave into sheets, cubes, or a variety of other patterns. Some minerals fracture, or break into pieces with no particular pattern at all. You could describe breaking with fracture as breaking with rough or jagged edges. In this example, copper exhibits fracture. This is easily identified by the jagged edges of copper. Muscovite mica exhibits cleavage. Mica can actually be peeled into thin sheets. This is the perfect example of a mineral that exhibits cleavage.

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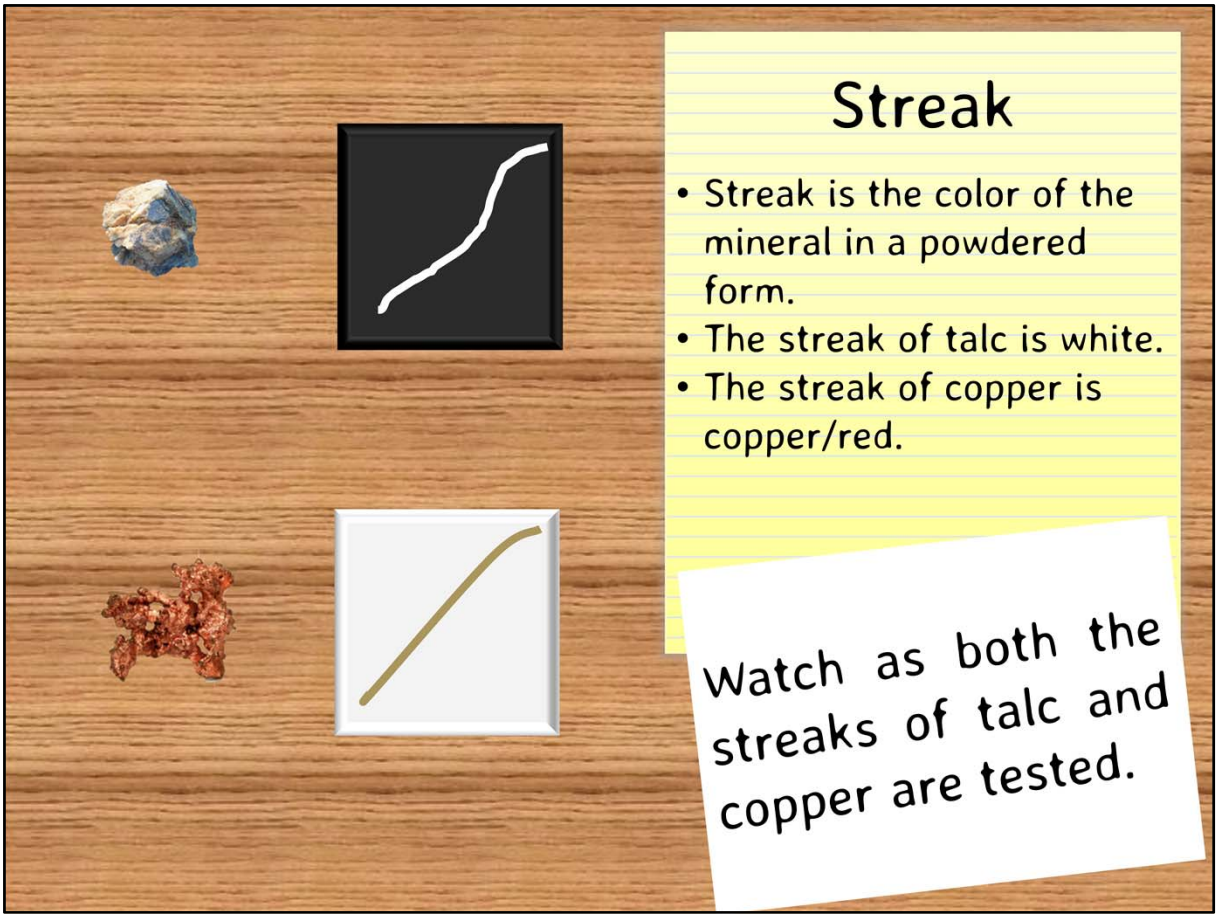


Streak is the color of the mineral in a powdered form. Since minerals can have a variety of different colors, it is best to rub the mineral against an unglazed piece of porcelain to test the color of the streak. The color of a streak will not vary. In some cases, minerals will be harder than the streak plate. These minerals will not leave any streak. It is also helpful to have a black and white streak plate. Some minerals leave a white streak that is not easily identifiable on a white streak plate. Other minerals leave a black streak that is not easily identifiable on a black streak plate. When tested with a black streak plate, talc will leave a white streak, since it is one of the softest minerals and easily leaves behind a streak. Copper is tested using a white streak plate. Copper will leave a greenish-bronze colored streak.

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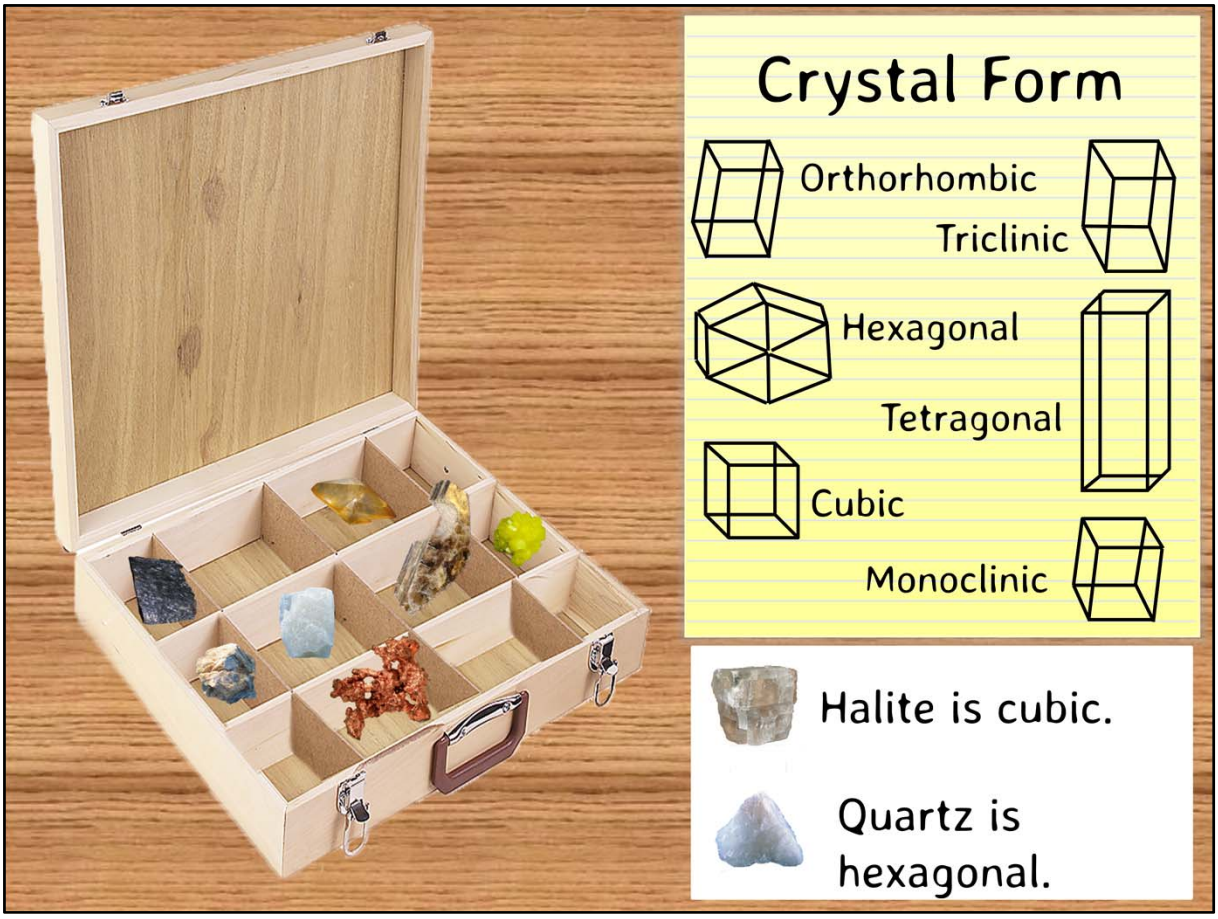


Geologists also examine the way minerals crystallize. Crystallization is the process by which a mineral grows. A crystalline structure is built when atoms arrange themselves in a repeating pattern. Time is a factor in determining the size of the mineral crystal. If a long amount of time takes place for the formation of the crystal, a large crystal will form. If the crystal is only given a short amount of time to form, a small crystal is the result. Whether the mineral crystallizes quickly or slowly, minerals of the same type have the same atomic structure and the same crystal pattern. Every mineral has a crystal shape based on one of the six crystal systems. The six crystal systems are: orthorhombic, triclinic, hexagonal, tetragonal, cubic, and monoclinic.

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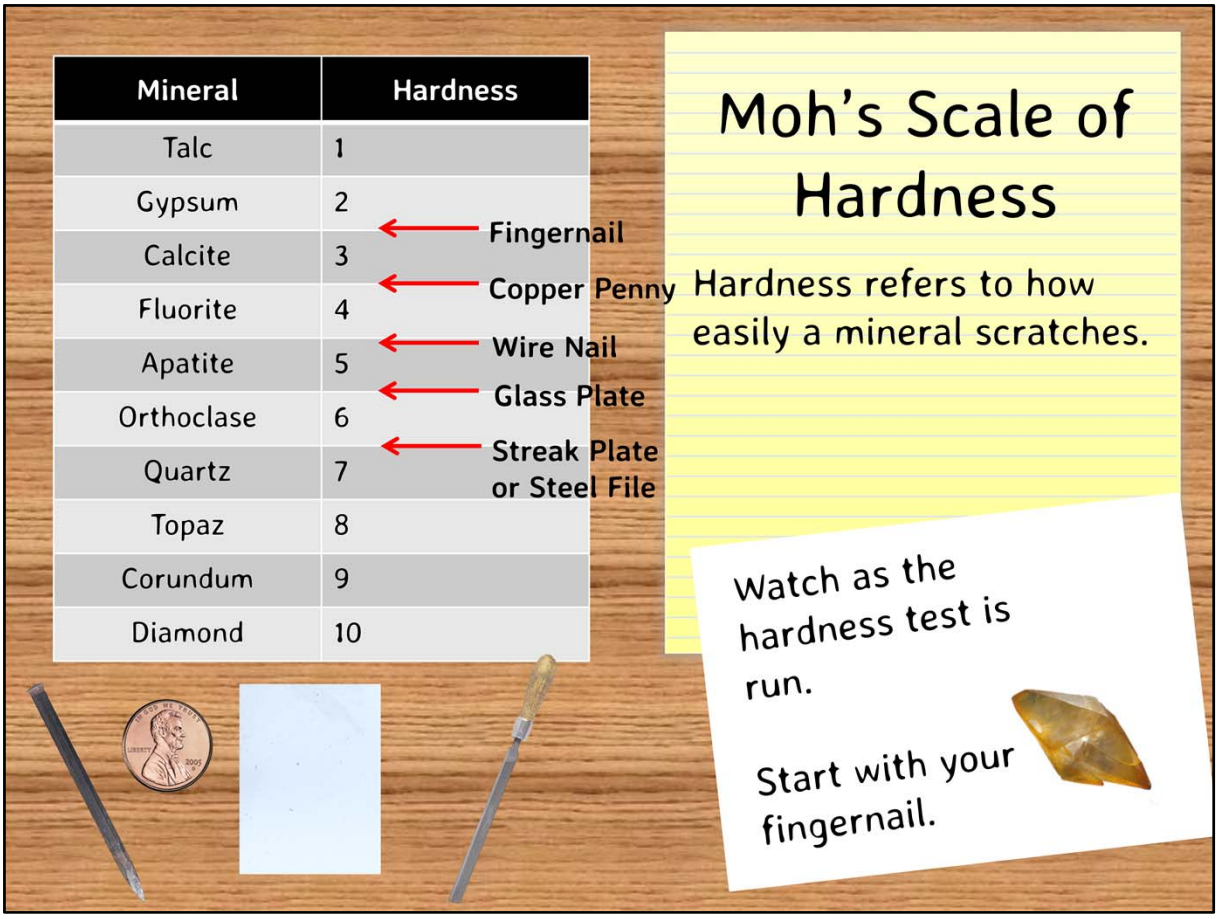


When you think about minerals you probably imagine that most minerals are fairly hard. But, did you know that you can scratch some minerals with your fingernail? Using a scratch test is one way to determine a mineral's hardness. Hardness is a minerals resistance to scratching. You can identify the hardness of a mineral by attempting to scratch it with common objects and by using the Moh's hardness scale.

Geologists use the Moh's hardness scale to determine the estimated hardness of a mineral. The Moh's scale is named after German mineralogist Friedrich Mohs, who devised the scale after determining that softer minerals could be scratched by harder minerals. He based the scale from one through ten. A mineral ranking one is very soft and can be scratched by all other minerals. A mineral ranking ten cannot be scratched by any other minerals. Diamonds are the hardest minerals on this scale. Talc is the softest mineral as it is easily scratched.

To use this scale take a mineral of unknown hardness and rub the common objects against the mineral in question. Start with your fingernail which has a hardness of 2.5. A copper penny has a hardness of 3.5 A wire nail has a hardness of 4.5 A piece of glass has a hardness of 5.5. A streak plate has a hardness of 6.5. If the mineral in question was the mineral calcite, it would not be scratched by your fingernail and it would be scratched by the copper penny. Calcite has a hardness of 3.

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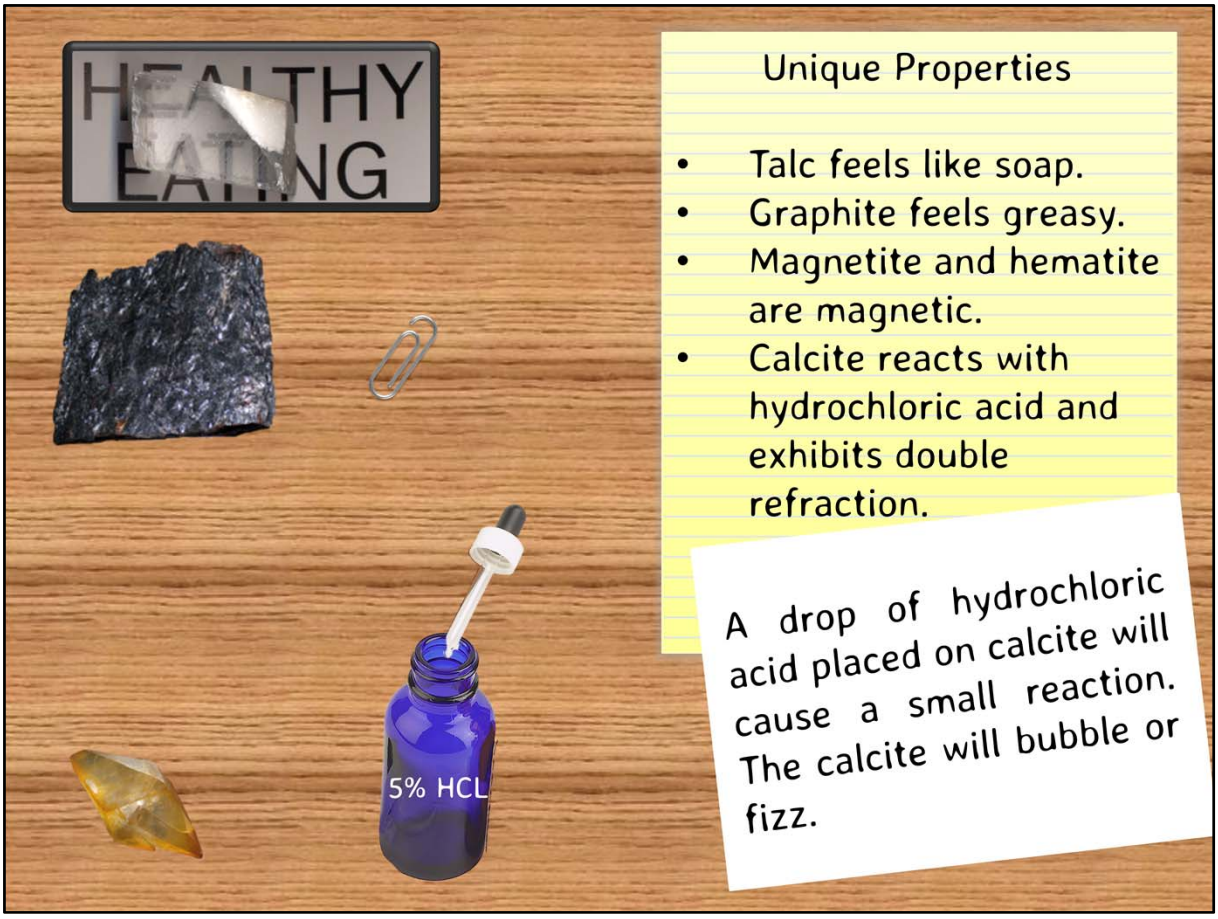


Some minerals are easy to identify because they have unique characteristics. For example, talc feels like soap. The mineral graphite feels like grease. Both minerals magnetite and hematite are magnetic. Magnetite will actually attract paper clips and small metal objects. Calcite has two distinct properties. A clear piece of calcite will refract light rays. When calcite is placed over printed material double lines of text will appear. However, it is not always easy to find a perfectly clear sample of calcite. Calcite will also react with a droplet of hydrochloric acid. Generally, a solution of weak hydrochloric acid will cause all carbonate minerals to react. This reaction will be seen as fizzing or bubbling.