

Luster

Overview: The sparkle, shine, sheen, or lack thereof is what geologists call luster. Luster describes how a mineral appears to reflect light, and this tells how brilliant or dull the surface of the mineral is.

What to Learn: Luster is the way a mineral reflects light, and it depends on the surface reflectivity.

Materials

- Sunlight
- Rock samples (in the video: pyrite, fluorite, and serpentine)

Experiment

1. Label and number each of your samples and record this on your data table.
2. Hold your mineral in the sunlight.
3. Use the list to find the word that best describes what you see. Look particularly on your sample for a surface that is clean and not tarnished, discolored, or coated. Look at cleaved surfaces and on uneven parts.
 - Metallic
 - Submetallic (duller than metallic)
 - Vitreous or glassy
 - Adamantine (like a cut diamond)
 - Resinous (like honey)
 - Silky (like a silk cloth)
 - Pearly
 - Greasy or oily
 - Pitchy (like tar)
 - Waxy (like a candle)
 - Dull or earthy
4. Record your observations in the data table.

Luster Data Table

Sample	Color	Luster Observations <i>(note the type of luster)</i>

Reading

Every mineral has a particular luster, but some have different luster on different samples. Since it's gauged by eye and not a scientific instrument, there's quite a lot to be left to the observer when describing it. Luster is not usually used to identify minerals, since it's so subjective.

That said, it is useful when describing a sample's surface, so hold up yours to the light and use the descriptions below to find the one that best describes what you see.

- Metallic or splendent luster are found in highly reflective minerals, like gold.
- Submetallic luster is found in minerals that have a similar luster to metal, but it's a bit duller and less reflective. These minerals are opaque and reflect light well. You'll find submetallic luster in the thin splinter sections of minerals, such as sphalerite, cinnabar, and cuprite.
- Vitreous or glassy luster describes 70% of all minerals, and they have the luster of glass. Quartz, calcite, topaz, beryl, tourmaline, and fluorite are examples of glassy luster.
- Adamantine lusters (brilliant, like a cut diamond) are for transparent materials that show a very bright shine because they have a high refractive index.
- Resinous lusters are usually yellow, orange, or brown minerals that have high refractive indices (like the way sunlight goes through honey).
- Silky lusters have very fine fibers aligned in parallel, so it looks like a cloth of silk. Minerals like asbestos, ulexite, and a variety of gypsum called satin spar all have silky luster. If a sample has fibrous luster, it is coarser than a silky luster.

- Pearly luster minerals look like the way light reflects off pearls, like the inside an oyster shell. These types of minerals have perfect cleavage, like muscovite and stilbite. Mica also has a pearly luster. Some pearly luster minerals also have an iridescent hue.
- Greasy or oily luster looks like fat, and is found in minerals that have a lot of microscopic inclusions, like opal and cordierite. Most greasy luster minerals also *feel* oily.
- Pitchy luster looks a lot like tar, and is found in radioactive minerals.
- Waxy luster resembles wax, the way jade and chalcedony look on their surface.
- Dull or earthy luster minerals have very little or no luster at all, because they have a surface that scatters the light in all directions, like with Kaolinite. Some geologists say that earthy luster means less luster than dull, but it's really a close call between the two.

When light strikes a surface, it can be reflected off the surface, like a mirror, or it can pass through, like a window, or both. Metallic luster has most of the light bouncing off the surface, whereas calcite has most passing through the mineral. When light travels through a mineral, it refracts, or changes speed, as it crosses the new material boundary. This is what makes the luster appear different for different materials.

Refraction is how light bends when it travels from one substance to another. When light moves through a prism, it bends, and the amount that it bends is seen as color that comes out the other side. Each color represents a different amount of bending that it went through as it traveled through the prism.

Exercises

1. What is refraction?
2. Feldspar has perfect cleavage on two surfaces but fractured on a third. What kind of luster would you say it has?
3. What type of luster is found on mica?

Answers to Exercises: Luster

1. What is refraction? (Refraction is how light bends as it travels through a substance.)
2. Feldspar has perfect cleavage on two surfaces but fractured on a third. What kind of luster would you say it has? (Feldspar is glassy on good cleavage planes but waxy or dull on the fractured side.)
3. What type of luster is found on mica? (Mica is glassy on the cleaved plane, but dull on the edges.)