NEW MEXICO MUSEUM OF NATURAL HISTORY & SCIENCE

# BRIEF GUIDE TO MINERALS

## What is the difference between a mineral and a rock?

• Minerals are the building blocks of rocks. Rocks are made up of minerals, just as buildings are made from bricks (or adobes). There are about 5000 known minerals, with about 20 new ones discovered each year. However, only about 50 common minerals form all of the rocks on Earth.

## What is the definition of a mineral?

•Usually (but not always) crystalline
•Inorganic (not made by a living thing)
•Solid at normal Earth surface temperature and pressure
•Formed naturally in the environment
•Composed of a unique atomic structure and a unique chemical composition.

*Quartz (variety: amethyst)*

## How are minerals described?

• By using physical characteristics such as hardness (how easily it is scratched), color, luster (appearance of the surface), specific gravity (or weight), and the color of the mineral when it is powdered (geologists use a porcelain "streak plate" for this test).

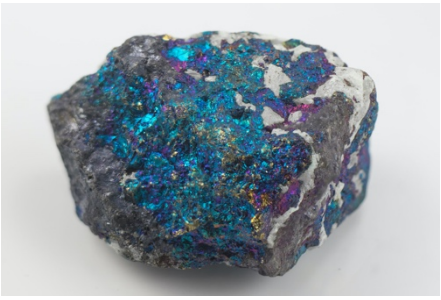
## How are minerals classified?

•By crystal structure (there are 32 crystal classes) and by chemical composition (combinations of the elements of the periodic table).
• Using chemistry, minerals can be classified into chemical groups, or families, that share similar combinations of elements.
•The most common mineral family on Earth is the silicate family. These minerals all have a combination of the elements silicon and oxygen, plus other assorted and variable elements. Examples of silicates include quartz, garnet, topaz, feldspar, and muscovite.

## How are minerals named?

• Many minerals known since the Greek and Roman periods were named for a distinctive property of the mineral or after a place. Topaz is named after an island in the Red Sea.
• Newly found minerals are usually, but not always, named after people with an "ite" ending put on the name. For example, smithsonite is a zinc-ore that was once mined in New Mexico and it was named after James Smithson, the founder of the Smithsonian.

## How are minerals used?



*Bornite (copper ore)*

• Some minerals are valued for their beauty and color and used as jewelry and decoration.
• Most minerals are used as resources for manufacturing and construction.
• Common things that are manufactured using minerals include computers, TV's, toilets, cameras, cell phones, cosmetics, eyeglasses, porcelain, plastics, steel, and wallboard. It is estimated that it takes 42 different minerals to manufacture a television.

• Each American will need 3.7 million pounds of various minerals and metals during their lifetime. Every year 47,000 pounds of new minerals must be mined for every person in the U.S.
• In the past, mines in New Mexico produced zinc, silver, copper and molybdenum in large quantities from ore minerals. Today, New Mexico produces oil, natural gas, coal, copper, potash, sand and gravel, cement, perlite, and travertine.

## What is the difference between a mineral and a gem?

*Tourmaline*

• Almost all gems are minerals. There are only two exceptions: pearl and amber, which are organic and not classified as minerals.
• Certain minerals that are both hard (therefore, durable and easily faceted or shaped) and beautiful, have become known to humans as "gemstones." This is a non-scientific term. Some minerals that are not considered gemstones are just as beautiful as those that are.
• A few gems are classified as precious gems (usually the hardest, most beautiful and rarest) and the others are called semi-precious gems (not as hard, not quite as beautiful, and not quite as rare).
• Frequently, the mineral name and the gemstone name are different. For example, the mineral beryl is called emerald when green, aquamarine when blue, and morganite when pink. The mineral corundum is called ruby when red and sapphire when blue. The mineral olivine is called peridot when used in jewelry. Opal, citrine, jasper, and amethyst are all gemstone varieties of the mineral quartz.

## What is New Mexico's state mineral?

*Cerrillos Turquoise*

• Our state "gem mineral" is turquoise. Turquoise is a member of the phosphate family group of minerals (Phosphate plus copper, aluminum and water).
• Turquoise is formed as a "secondary mineral" in veins that form in old volcanic rock in arid areas.
• The name is French for "Turkish" because the original stones from Persia (Iran) came to Europe in trade through Turkey. Turquoise has been mined in New Mexico, in the Cerrillos Hills, for over a thousand years.

## Is diamond the rarest mineral on earth?

• No. Diamond is actually quite a common gem on Earth. The high price is artificially inflated by the market (the small number of good diamonds that are sold each year).
• Although diamonds are formed at very high pressure and temperature deep inside the earth they are frequently found in eroded or excavated areas of old volcanism.

**On the first Monday of each month, when the museum is open, you can bring a mineral for identification. Or…Go to http://www.nmnaturalhistory.org/exhibits/youth-and-family-programs/mineral-monday-online-edition for information about sending a photo/description of a mineral to be identified.**

**For questions about this Brief Guide, contact:**
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**Additional resources and information can also be found at the website for the Albuquerque Gem and Mineral Club (AGMC).** Go to https://www.agmc.info/ **And when the museum is open, stop by the AGMC lapidary studio, in the Museum atrium.**

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# MINERALS IN THE MUSEUM

## Where can you find minerals on exhibit in the Museum?

- The Mineral Gallery in the *Atrium*
- Cave minerals in the *Cave Experience*
- Gypsum in the *Age of Supergiants* Hall
- *Land of Volcanoes* - the volcano-on-its-side in the walk-through volcano exhibit.

## How are minerals displayed in the Mineral Gallery?

The minerals within the large cases are organized by chemical family.

•The case on the left (of the three cases) on the north wall displays minerals in the sulfide, sulfate, or oxide families. Look for the S, $S_2$, $S0_4$, or $0_2$ in their chemical compositions. Many of these minerals are used for industrial purposes, and are called **economic minerals** or **resource minerals**. The low case in the center of the gallery shows many of the **economic minerals** that were mined in New Mexico.
•The middle case on the north wall is filled with varieties of the mineral quartz. Amethyst, citrine, agate, and opal are some of the gemstone names of quartz.
•The case on the right contains carbonate minerals (look for the $CO_3$ in their chemical composition). For example, malachite is a carbonate mineral.
•The next case (on the east wall) contains silicates (minerals that have some number of Si and O atoms in their chemical composition). Many of our most common minerals) are silicates since silicon and oxygen are the most common elements in Earth's crust. Many of our most valuable gems are silicates because silicates are hard and durable.
• Small corner cases include unusual specimens such as purple halite from New Mexico and one of the largest nuggets of turquoise ever discovered.

## How are minerals displayed in the Volcano exhibit?

• Inside the Museum's walk-through Volcano, you will find a display showing a volcano turned on its side, with Earth's mantle on the left and Earth's surface on the right.
• The display shows various mineral and rocks at the depth and temperature at which they form within the Earth.
• For example, deep within the Earth, high temperature minerals such as diamond, garnet, and olivine crystallize; and near the surface, where water can circulate, minerals such as turquoise, gold, silver, and copper can be deposited.
• It is a one-of-a-kind exhibit – no other museum has anything like it – don't miss it!