

**Teacher field trip guide to the New Mexico  
Bureau of Geology & Mineral Resources  
Mineral Museum**

This guide is intended to assist teachers in their rock & mineral curriculum and to reinforce key concepts, common minerals & their uses. Each museum staff member has their own emphasis and the material presented will vary depending on available time, interest from students, age & grade level of students, and specific teacher requests.

Definition of a mineral:

Minerals are inorganic, naturally occurring, have a fixed chemical composition, and an orderly arrangement of atoms.

Definition of a rock:

Any naturally occurring mass or aggregate of material is a rock. Rocks can be made up of minerals (two or more minerals make a rock. All minerals can be called rocks, not all rocks are minerals (analogy: all squares are rectangles, not all rectangles are squares). Rocks may have fossil material in them.

Minerals are mined from the earth and processed into products that we desire. Mines can only exist where ore is found. Ore is a concentration of rock that contains sufficient quantities of elements we need to make products that we want in to be profitable. Not all ore bodies are mined.

Rocks and minerals have many uses in everyday life.

***Some rocks are burned.*** A good example of this is coal. Coal is abundant in northwestern NM and is used to produce electricity. How? Coal is burned to heat water; the water drives turbines, the turbines are connected along a shaft to generators that generate electricity using magnets and coiled wire (you can make generators in your classroom and have the students generate the electricity to e.g. light a lightbulb). This electricity is carried across many states to power users.

***Some minerals are eaten.*** A good example of this is halite. Halite is also called rock salt and abundant in southeastern NM. We use salt on our foods and in chemicals (to make hydrochloric acid) and to salt roads to rid them of ice. Another mineral commonly found in foods is feldspar. It is a good anti-caking agent and is often used in sugary or other sticky foods (e.g. coffee creamer, pudding mixes, thickeners).

***Some minerals are used in medicines.*** A good example of this is bismuthinite. Bismuthinite is one of the two main ingredients in Pepto-Bismol. The “pepto” part is pectin, which is used in gelling jelly (derived from apples), and “bismol” is derived from bismuthinite. Fluorite is another mineral that is used in medicine. Fluorite is the source of fluorine in toothpaste. Fluorine helps make teeth stronger and whiter. Another mineral commonly used in toothpaste is aragonite. Aragonite is a very mild abrasive and helps clean the tooth surfaces. Aragonite is also commonly found in ant-acids. Aragonite

dissolves readily in the stomach and neutralizes acids, making it the active ingredient in e.g. Roloids or Tums.

***Some minerals are used in construction.*** A good example of this is gypsum. Gypsum is the white powder in wallboard. Quartz is melted and quenched into glass, it is also used in silicon chips (quartz =  $\text{SiO}_2$ ).

***Some minerals can have many different colors.*** Quartz and fluorite are two minerals that can have lots of different colors. Purple quartz is called amethyst, black or brown quartz is called smoky quartz, yellow quartz is called citrine and pink quartz is called rose quartz. Fluorites are all just called fluorite.

***Some minerals always have the same color.*** Azurite is always bright blue. Malachite is always dark green. Galena is always shiny silver. Pyrite is always golden and is therefore also called “fool’s gold.”

***The same mineral will always have the same crystal arrangement.*** Minerals that have the same chemical formula but different crystal arrangements have different names and can have vastly different properties. Diamond and graphite both have the chemical formula “C” but diamonds are tightly packed and in the “isometric” crystal system, while graphite is loosely bonded and in the “hexagonal” crystal system. Graphite is often called pencil lead, even though it contains no lead. Another mineral pair that has the same chemical formula ( $\text{CaCO}_3$ ) but different atom arrangement is calcite – aragonite. Calcite is rhombohedral and often seethrough. Aragonite likes to form “dendrites” (look like trees) and is soft enough to use in Tums and toothpaste, where calcite would be too hard and not dissolve well enough.

***Some minerals fluoresce.*** Minerals fluoresce because they absorb the energy from fluorescent light and then emit light. Some minerals always fluoresce (e.g. scheelite and fluorite), but minerals can contain trace elements that quench (eliminate) the fluorescence, so even fluorescent minerals will have different responses to the blacklight. Some minerals can absorb enough energy that they “glow in the dark” after they have been exposed to blacklight. This is very rare in minerals.

Please feel free to use any and all of this material in your classroom before you visit the museum. If you have any questions, don’t hesitate to contact me or Dr. Virgil Lueth.

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