Earth Revealed VIDEO #12: Minerals

This assignment can be found at:

https://www.learner.org/series/earth-revealed/12-minerals-the-materials-of-earth/

0:00-2:17 Remarks by series host (with images)

The importance of **(01)** to humans and how our civilization depends on them is presented. The source of minerals that provide iron and glass, as well as the processing and final product produced, is shown with images. The minerals contained in granitic and basaltic rock are shown with images.

2:18-4:23 Interview with J. Lawford Anderson, USC (with images)

Minerals are useful in classifying rocks. They are clues as to how rocks form. Minerals can be used to determine the age of rocks. **(02)** study the minerals in sediment to discover how sediment is changed into rock. Igneous and metamorphic **(03)** study mineral content to learn about the pressure and temperature histories of igneous and metamorphic rocks. **(04)** would use the magnetic record in the minerals in some rocks to show the directions tectonic plates have taken during Earth history.

4:24-5:34 Images

Over 2,000 varieties of minerals exist on Earth and new ones are still being discovered. Most are quite rare. Only a few are common in Earth's crust**.** Images of quartz, olivine, orthoclase, and plagioclase are shown. These common **(05)** comprise most of the rocks on Earth and are also used as the basis for classifying rocks. Before a rock can be classified, its minerals must be identified.

A) Minerals **B) Petrologists** **C) Rock-forming minerals** **D) sedimentologists** **E) Structural geologists**

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5:35-8:42 Animation • Images • Interview with Rick Hazlett, Pomona College

Differences in mineral varieties are related to **(06)** . A ping pong ball model demonstrates the internal atomic arrangement of molecules in a mineral. In the structure of a mineral, **(07)** are held together by chemical bonds. Animation is used to show how anions and cations are arranged in a network composing the internal structure of a mineral. Explanation is provided about how the anions and cations neutralize each other electrostatically in the formation of a more stable **(08)** . An analogy to the strength gained from a crystal structure is presented using loose cinder blocks and a cinderblock wall. Each type of mineral has its own unique crystal framework. Images of actual **(09)** are shown. A mineral's **(10)** can be quite different from the elements of which it is composed. Halite or salt, for example, is needed by the body, yet it is composed of two elements, sodium and chlorine, that can be very dangerous.

A) Atomic structure B) Chemical properties C) Crystal growth D) Crystal structure E) Ions

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8:43-12:55 Remarks by series host (with images)

A steel knife, hydrochloric acid, and a hammer can be used in the field to help identify minerals by their physical properties. A hammer is used to demonstrate mineral **(11)** **.** Other physical properties **(**color, luster, streak, and cleavage**)** are described as means for mineral identification. A discussion is presented on how to use these physical properties to differentiate among minerals.

12:56-16:59 Interview with J. Lawford Anderson (with demonstration)

Study of minerals in a rock can provide clues to the age of the rock and where it originated. Petrologists make very thin slides containing rock sections called **(12)** **.** The formation of thin-sections and their use is presented with images. Thin-sections are shown rotating on a microscope stage where **(13)** **,** concentric zonation, and cleavage can be seen. X-ray analysis is used to provide information on the composition of minerals and rocks. Images show sample preparation from grinding and crushing through weighing and melting and finally x-raying to determine mineral composition. A summary of the petrogenesis of a sample from the Whipple mountains is presented explaining what can be learned from the process.

17:00-18:57 Interview with J. Lawford Anderson (with images and animation)

The conditions under which a mineral forms may be clearly reflected in its atomic structure and therefore in its physical properties. Diamond and graphite, for example, are composed of the same element, carbon, but the conditions under which the two minerals form is very different. Because of this the minerals are also very different. The differences between and the reasons for the differences in diamonds and graphite are explained. Animation is used to show the differences in the **(14)** nature of diamond and graphite which is responsible for the vast difference in hardness of the two minerals. This animation is also useful in explaining the concept of **(15)** **.**

A) Bonding	**B) Cleavage**	**C) Crystal twins**	**D) Hardness**	**E) Thin-sections**

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18:58-22:38 Images • Interview with J. Lawford Anderson

Images of rare and beautiful diamonds, **(16)** and gold coins are shown to emphasize the value some minerals possess. The value of gold is based on its function as money. The power of gold can be seen in the settlement of California. The settlement of California came about because of the discovery of gold at **(17)** . Historic images are presented of the **(18)** on California, and later in the Yukon territory of Alaska. The conditions that lead to localized deposits of minerals are discussed. **(19)** are described and images help show how minerals precipitate out of solution. The formation of ore **(20)** is explained.

A) Deposits	B) Gold rush	C) Gold	D) Hydrothermal solutions	E) Sutter's Mill

22:39-24:32 Images • Interview with Thomas Hartnett, Rancho Santiago College

Chemical reactions with minerals in water can cause the minerals to crystallize directly from the water. Hematite forms in this way. Hematite can form and then adhere to sand grains, cementing them together into red sandstone. Evaporation of seas or lakes can trigger **(21)** of minerals from solution. Deposits of gypsum and halite form in this manner. Minerals can also precipitate directly from gases. This process is called **(22)** and images of sulfur crystals are used in the explanation of the process of **(23)** ıages are used to show several minerals with various processes of formation.

24:33-25:55 Images

(24) are described as the most common type of mineral found in Earth's crust. Although not as valuable as gold or diamonds, they do have value in today's society. They have enormous value in construction and silicon is used in computer technology. The valuable properties of silicon are discussed.

25:56-end Remarks by series host

Minerals have a fundamental role in the political, economic, and technological evolution of human civilization. **(25)** study minerals to unlock the geologic history of the rocks that contain them and of Earth itself.

A) Crystallization	B) Geologists	C) Precipitation	D) Silicates	E) Sublimation