

# Module 5: Minerals



## Topic 2 Content: Mineral Groups Notes

### Introduction

#### Mineral Groups

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All minerals are organized into one of seven different groups based on their chemical composition. Each year, more minerals are identified and classified into one of these groups. The mineral groups include the silicates, sulfides, sulfates, carbonates, oxides, native elements, and halides. In this activity, explore the seven different mineral groups by clicking on the different icons below.



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### Silicates

**Mineral Groups**

#### Silicates

Silicates are the most common group of minerals. A mineral is classified as a silicate if its chemical formula includes silicon (Si) and oxygen (O). Silicon and oxygen are the two most abundant elements in the Earth's crust, which is why the silicates are the most common mineral group. Silicate minerals are so common that they make up more than ninety percent of Earth's surface. The most common example of a silicate mineral is quartz. Quartz has the chemical formula ( $\text{SiO}_2$ ).



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### Sulfides

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##### Sulfides

The sulfides are a group of minerals containing the element sulfur. The majority of these minerals form in thermal or hot-water solutions. Two common examples of sulfides are galena ( $PbS$ ) and pyrite ( $FeS_2$ ). Galena is used in gasoline and batteries. Pyrite is commonly known as "fool's gold." This common mineral is used in jewelry, as well as the manufacturing of paper.



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### Sulfates

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#### Sulfates

The sulfates are a group of minerals containing both sulfur and oxygen. Sulfates form when mineral-rich waters evaporate. The most common example of a sulfate is gypsum ( $\text{CaSO}_4(2\text{H}_2\text{O})$ ). Gypsum is used in drywall, cement, and plaster of Paris.



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### Carbonates

#### Mineral Groups

##### Carbonates

The carbonates are a group of minerals that contain both carbon, oxygen, and one other metallic element. Carbonates are the second most common mineral group. The most common carbonate mineral is calcite ( $\text{CaCO}_3$ ). Calcite is used in construction, as it is found in both limestone and marble rocks. Calcite is also used to neutralize acidic substances in soil.



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### Oxides

#### Mineral Groups

##### Oxides

The oxides are a group of minerals that contain oxygen and one or more other elements, which are usually metals. Oxides can form when magma cools deep within the Earth, or when minerals are exposed to changes in temperature and pressure. Still, other oxides form when they are exposed to oxygen in the air. Hematite is a common oxide ( $\text{Fe}_2\text{O}_3$ ). Hematite is used in iron manufacturing, in paint, and in jewelry. The transparent varieties of the oxide corundum ( $\text{Al}_2\text{O}_3$ ) are known as rubies and sapphires. These precious gems are used in jewelry.



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### Native Elements

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#### Native Elements

A group of minerals that are made of only one type of element are called the native elements. You are probably familiar with some of these native elements, such as sulfur (S), copper (Cu), silver (Ag), and gold (Au). You may notice that most of these native elements are metals. Native metals are rare because most metals combine with oxygen, forming oxide minerals.



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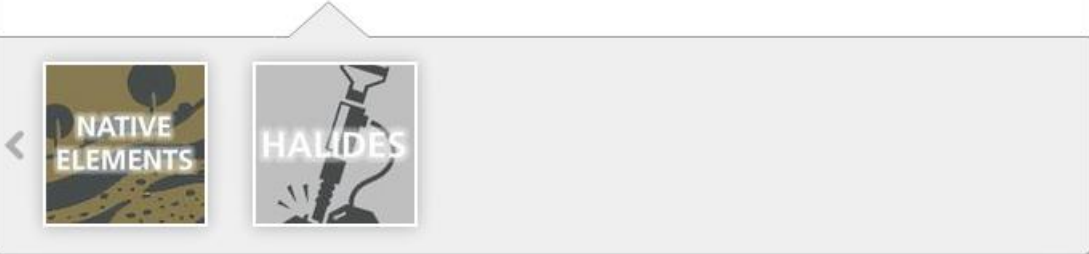

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#### Halides

### Mineral Groups

#### Halides

A mineral is considered a halide if its chemical formula includes chlorine (Cl) and/or bromine (Br) and/or fluorine (F) and/or iodine (I). The most common halide mineral is halite (NaCl). Halite is better known as salt. Halite forms naturally when seawater evaporates.



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