

Minerals

Sources and Uses of Minerals

..... Before You Read

What do you think? Read the two statements below and decide whether you agree or disagree with them. Place an A in the Before column if you agree with the statement or a D if you disagree. After you've read this lesson, reread the statements to see if you have changed your mind.		
Before	Statement	After
	5. An ore is a concentration of minerals that contains only iron.	
	6. Gemstone and ore deposits are evenly distributed around the world.	

..... Read to Learn

Mineral Resources

Think about all the rock, brick, mineral, and metal resources used to build your school. Where do those resources come from?

The average person uses 22,000 kg of mineral resources each year. For example, copper is used in electrical wiring and plumbing. Quartz is used to make glass and ceramics. Mineral resources are used in the automotive industry, in agriculture and food production, and in the construction of roads, homes, and other buildings.

You learned that minerals form in a variety of different environments. Sometimes these minerals are deep within Earth and are difficult to find. Other times, the minerals might be on Earth's surface, such as a salt lake deposit.

People mine mineral resources because they are useful in everyday life. The mined materials must contain enough of the mineral or rock resource to produce a profit. *Rock that contains high enough concentrations of a desired substance, such as a metal, so that it can be mined for a profit is called an ore.* For example, aluminum is mined from the mineral bauxite. It is a profitable ore used in a variety of industries such as electronics, the food industry, and transportation.

Key Concepts

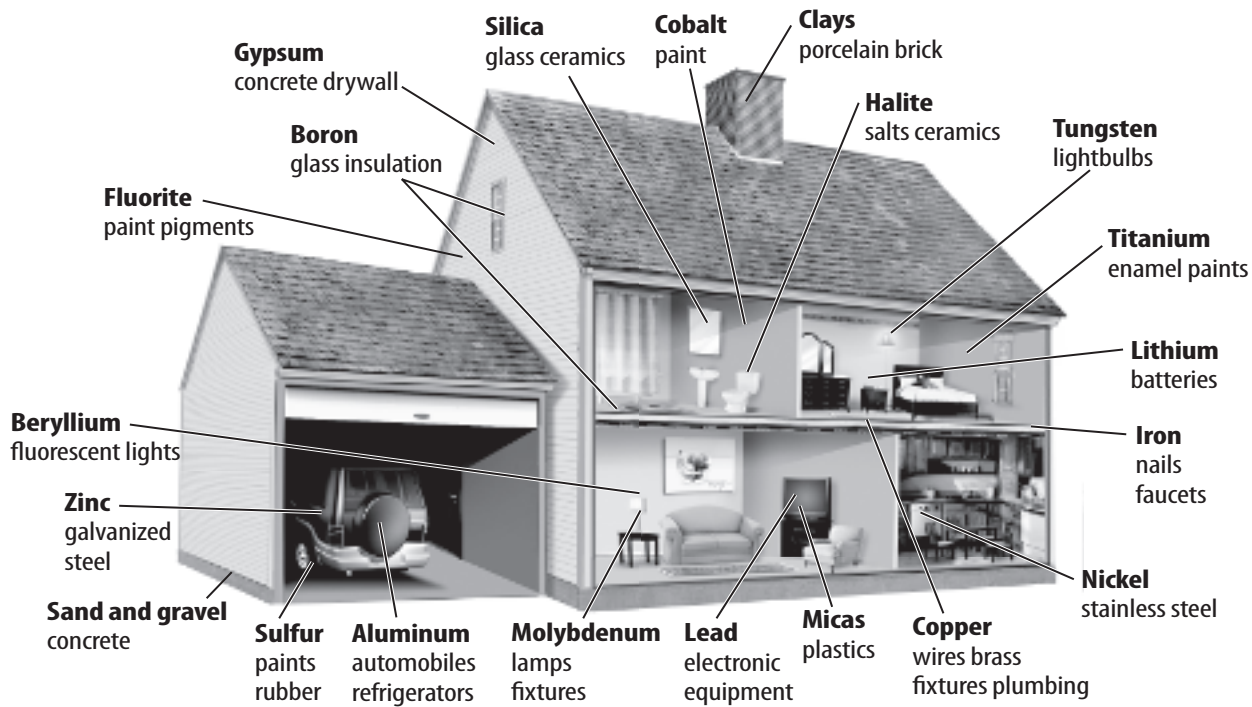
- How are minerals used in your daily life?
- Why are minerals a valuable resource?

Study Coach

Create a Quiz As you read this lesson, write quiz questions about what you are learning. Make sure that you answer the questions, too.

Think it Over

1. Describe How are minerals used in daily life?

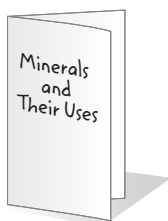


Visual Check

2. Identify Name a mineral that is part of the ceramics used in homes.

FOLDABLES®

Make a two-tab book to record information about the uses of minerals in your everyday life.



Reading Check

3. Identify What mineral contains large amounts of aluminum?

Metallic Mineral Resources

Ores of the elements iron (Fe) and aluminum (Al) are metallic mineral resources available in large amounts. They are used every day. For example, the minerals hematite (Fe_2O_3) and magnetite (Fe_3O_4) are important sources of iron. Iron is the main ingredient in steel. Steel is used to build bridges, buildings, and vehicles. Iron is also a common ingredient in nails, screws, and fixtures in homes. The figure above shows examples of uses of minerals in a home.

Metals are also used in the food industry. Beverage and food cans are made of aluminum. Aluminum is plentiful in Earth's crust. It rarely occurs as a native element, however. The mineral bauxite is a mixture of aluminum and other elements. After bauxite is mined, the aluminum is removed from it. This aluminum is used to manufacture a variety of products. The mining industry processes huge amounts of aluminum each year. ✓


Rare Metals

Gold Gold occurs in a ratio of 1 part gold to 4 billion parts rock in Earth's crust. Gold occurs in concentrations that are, however, large enough to be mined for a profit. Its yellow color and metallic properties make gold a desirable metal for making jewelry. Gold is a good conductor of electricity and does not corrode. It has many scientific and industrial uses.

Platinum The technology industry depends upon other metallic mineral resources. Platinum is used in catalytic converters to help control the release of harmful gases from automobiles. The converters change these gases into CO_2 and water. Scientists are currently researching the use of platinum in fuel cells for electric cars. These cars will not produce harmful gas emissions. They will be better for the environment.

Nonmetallic Mineral Resources

Every day you use minerals that are not ores. Raw materials used for road construction, ceramic products, building stone, and fertilizers are all examples of nonmetallic mineral resources.

Have you ever played with sand in a sandbox or at a beach? Sand is a nonmetallic mineral resource. Sand is usually made of particles of the mineral quartz (SiO_2). 

Gemstones

A **gemstone** is a rare and attractive mineral that can be worn as jewelry. Some minerals, such as diamonds and rubies, take on special characteristics when they are cut and polished. The brilliant luster of a cut and polished diamond is what makes diamonds valuable gemstones. Emeralds, sapphires, and rubies are also gemstones.

The physical properties of gemstones also make them useful in industry. For example, on the Mohs hardness scale, a diamond has a hardness of 10 and corundum has a hardness of 9. Because of their hardness, they are commonly used in abrasives and in cutting tools. Of course, large gem-quality diamonds would not be used for these purposes. Today, many gemstones used in industry are manufactured by humans. They are known as synthetic stones. Sometimes human-made gemstones are less expensive than the same natural gems.

Math Skills

The amount of metal that can be obtained from an ore is called the percent yield. For example, when 500 kg of iron oxide (Fe_3O_4) is processed, 308 kg of pure iron (Fe) is produced. What is the percent yield?

- a. Express the numbers as a fraction.

$$\frac{308 \text{ kg Fe}}{500 \text{ kg Fe}_3\text{O}_4}$$

- b. Convert the fraction to a decimal.

$$\frac{308}{500} = 0.616$$

- c. Multiply by 100 and add %.

$$0.616 \times 100 = 61.6\%$$

4. Use Percentages If the 500 kg of ore in the previous example is ground up before processing, 410 kg of iron (Fe) is produced. How much does grinding improve the percent yield?

Key Concept Check

5. Identify List at least five examples of minerals and their common use.

..... After You Read

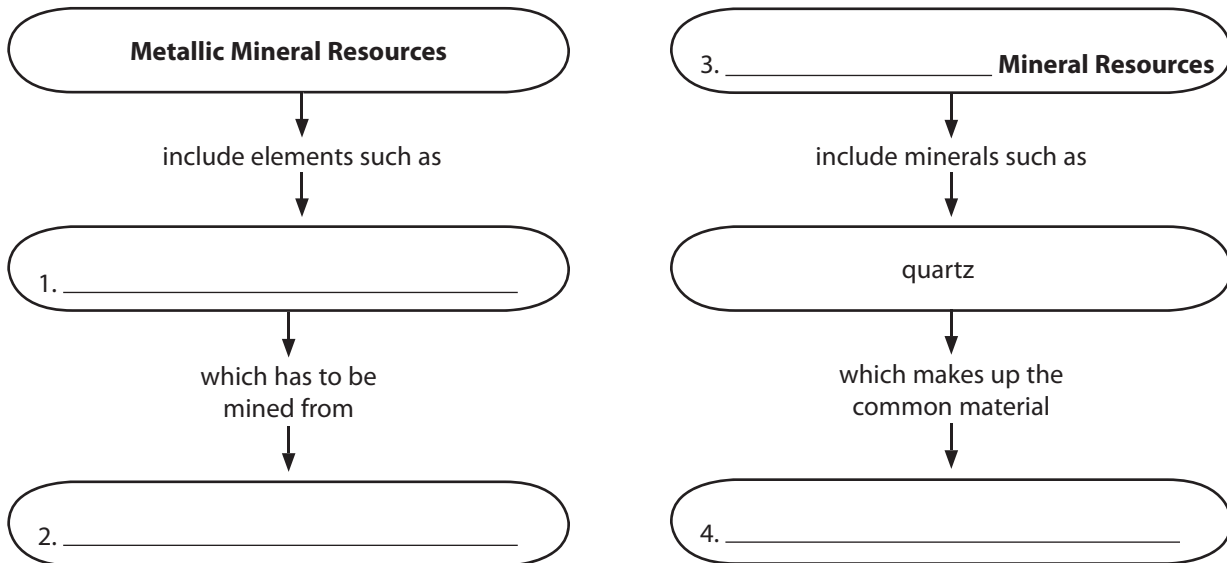
Mini Glossary

gemstone: a rare and attractive mineral that can be worn as jewelry

ore: rock that contains high enough concentrations of a desired substance, such as a metal, so that it can be mined for a profit

- Review the terms and their definitions in the Mini Glossary. Write two sentences describing how metallic and nonmetallic ores are used every day.

- Fill in the blanks in the graphic organizer below with the correct answers about mineral resources and uses.



- Could you answer all the quiz questions that you wrote without looking at the lesson again? What ideas about the sources and uses of minerals do you need to review?

What do you think **NOW?**

Reread the statements at the beginning of the lesson. Fill in the After column with an A if you agree with the statement or a D if you disagree. Did you change your mind?



Log on to ConnectED.mcgraw-hill.com and access your textbook to find this lesson's resources.

