

Identifying Minerals and Mineral Products

Minerals are used in many products that we use every day. Some minerals are used in their raw form. Table salt is actually a mineral called *halite*. Other minerals are added to the contents of a product to make it more useful. Toothpaste contains fluoride to help strengthen our teeth. Fluoride comes from the mineral fluorite.

Our use of minerals depends on what properties they have. If a mineral has the property of being hard, it can be used for cutting softer objects. A mineral with an attractive luster and color might be used in jewelry. The following is a list of properties we may use to identify minerals: luster (shine), hardness, color, streak, and specific gravity.

In this lab, you will examine samples of common minerals and test them for their properties. Then, you will go on a scavenger hunt in your home to find consumer products that use these minerals. You will develop a better understanding of minerals and how we use them in our lives.

OBJECTIVES

Measure the properties of various minerals.

Identify the many uses of minerals in consumer products.

Recognize the importance of minerals in our daily lives.

MATERIALS

- Balance
- Collection, minerals
- Graduated cylinder, large (plastic preferred)
- Mineral test kit
- Notebook
- Pencil, graphite
- Streak plates



Procedure

1. With your lab team, examine the mineral samples provided by your teacher. Observe the minerals available to you, and perform the tests as directed. Properties of minerals include physical properties, optical properties, and chemical properties. You will be testing optical properties such as luster, color, and streak; you will also be testing physical properties such as hardness and specific gravity.

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Luster refers to the appearance of the mineral's surface. Some descriptive terms include metallic, submetallic (not as shiny or reflective), adamantine (diamond-like), resinous (resin-like), vitreous (china-like or resembling broken glass), pearly, silky, or earthy. Colors may vary greatly and may be directly observed. Streak refers to the color of a powdered mineral. Streak is determined by drawing the mineral across a piece of white unglazed porcelain called a *streak plate*. While colors vary greatly, streak has far less variation.

Hardness may be determined by scratching one mineral with another, or by scratching (or attempting to scratch) a mineral with a material of known hardness. Hardness is measured on a scale of 1–10, with 1 representing softest and 10 representing hardest. Your fingernail is about 2 1/2. The steel blade of a pocket knife is about 5 1/2. Minerals with hardness of 6 and above will scratch a piece of glass.

The hardness scale for minerals includes:

1. Talc (softest)	6. Orthoclase
2. Gypsum	7. Quartz
3. Calcite	8. Topaz
4. Fluorite	9. Corundum
5. Apatite	10. Diamond (hardest)

Specific gravity (SG) is a precise numerical value that describes a mineral's weight when compared to the weight of an equal volume of water.

To determine SG, first determine the mass of the mineral sample. Then, find the mineral sample's volume by measuring how much water it displaces.

Place some water in a graduated cylinder. Tap gently on the graduated cylinder. Note the amount of water. Carefully drop in the mineral sample. Record the new water level. Subtract the two figures to find the volume of the mineral sample.

Divide the mass of the mineral sample (in grams) by its volume (in milliliters). The result is the SG. A SG of 5 means that the mineral is 5 times heavier than water.

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Fill in the table provided for each mineral's properties.

Mineral Properties

Mineral	Luster	Color	Streak	Hardness	Specific Gravity
Bauxite (a mixture of several minerals)					
Beryl ($\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$)					
Chromite (FeCr_2O_4)					
Cinnabar					
Cuprite (Cu_2O)					
Fluorite (CaF_2)					
Galena (PbS)					
Gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$)					
Halite (NaCl)					
Hematite (Fe_2O_3)					
Pyrolusite (MnO_2)					
Rutile (TiO_2)					
Silver (Ag)					
Talc ($\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$)					
Tungstite ($\text{WO}_3 \cdot \text{H}_2\text{O}$)					
Zircon (ZrSiO_4)					

Identifying Minerals and Mineral Products *continued*

- 2.** Go on a mineral scavenger hunt (in your home) to find products that contain the following elements or minerals. Record the types of products you find that use the various minerals below.

aluminum _____

chromium _____

copper _____

fluorite _____

gold _____

gypsum _____

halite (salt) _____

iron _____

lead _____

mica _____

nickel _____

silica _____

silver _____

talc _____

titanium _____

tungsten _____

zinc _____

Analysis

- 1. Describing Events** Identify three actual minerals, as opposed to products that contain minerals, that people use frequently.

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- 2. Explaining Events** Explain the properties of one of these minerals from question 1 and why these properties make this mineral so useful.

- 3. Organizing Data** Compile the results of the scavenger hunt from each member on your lab team into a single list in a notebook. Record some types of products below that you did not identify in your personal list.

- 4. Examining Data** Analyze the compiled team list. What three minerals were used in the greatest number of products, according to your team survey?

Conclusions

- 5. Interpreting Information** Imagine your life without the use of these minerals. How would your life be different? Give one example.

Extension

- 1. Research and Communications** Analyze one of the mineral-containing products that you use every day. Research how much (by weight) of the key mineral is used in one container of the product. Estimate how much (by weight) of this mineral you use every year. Communicate the results of your research and calculations during a class discussion.