

## Rock vs. Minerals

### Introduction:

What is a mineral? These are the characteristics of minerals followed by a brief explanation of each characteristic.

A mineral:

Is naturally occurring

Is a solid

Is inorganic (mostly)

Has a fixed chemical formula

Has an orderly crystalline structure

Let's look at these one at a time.

Naturally Occurring

To be considered a mineral it must have been formed by natural geologic processes.

Laboratory created gems (synthetic diamonds, rubies, etc.) don't count.

A Solid

By definition, minerals are solid within the normal temperature ranges of the earth's surface.

Inorganic

Generally, a mineral is a naturally occurring solid with a crystalline structure.

This is where it gets a little tricky.

Halite or table salt is a mineral. Sugar is a crystalline solid but comes from plants, sugar cane or sugar beets. This classifies it as an organic compound and so is not a mineral. Coal on the other hand also comes from plants (organic) and is generally considered a mineral.

There are also marine animals that make their shells from calcite (calcium carbonate). Calcite is a mineral but since it is secreted by animals to form shells it is inorganic. Geologists generally consider this inorganic calcite a mineral.

What is a mineral? It has a fixed chemical formula

Each mineral has a particular chemical make up. While most minerals are compounds of two or more elements, some minerals are made up of a single element. Gold, silver and copper are called native elements and occur in nature in relatively pure form.

The vast majority of minerals are compounds or mixtures of elements. These mixtures are consistent. For halite, the chemical formula is NaCl or sodium chloride. Each

sodium atom is combined with one chlorine atom. The formula for Quartz is SiO<sub>2</sub>, silicon oxide. For every atom of silicone, there are two atoms of oxygen.

There are about 4000 known minerals on earth. Each one is a unique substance with its own chemical formula. Most of these are very rare.

That narrows down the field quite a bit.

There are only eight groups of minerals that are common. They are called rock-forming minerals. They are:

Native elements

Sulfides

Oxides

nitrates

phosphates

sulfates

Halides

Silicates

It Has an orderly crystalline structure

Minerals have an orderly crystalline structure. This means that the atoms or ions that make up a mineral are arranged in an orderly and repetition.

### Rock Classification:

Rocks are classified by how they are formed. There are three basic groups, igneous, sedimentary, and metamorphic.

In each group, distinctions are made for texture or grain size and chemical or mineral content.

### **Notes for the teacher:**

This lesson plan will give students the opportunities to use words to describe visual, textural, and other physical qualities of simple rock specimens.

**Grade level:** 6 th grade

### **Objectives:**

1. The students will be able to use observation to sort and classify a group of rocks and minerals.
2. The students will be able to use comparisons to make groups.
3. The students will be able to get an introduction on the distinction between a mineral ( one element or compound ) and a rock ( composed of various minerals).

4. The students will get an introduction on the types of rocks: igneous, sedimentary, and metamorphic.

### **Benchmarks:**

**S.IP.06.11.** Generate scientific questions based on observations, investigations, and research.

**S.IP.06.15.** Use tools and equipment appropriate to scientific investigation.

**S.IA.06.13.** Communication and defined finding of observations and investigations using evidence.

**E.SE.06.41.** Compare and contrast the formation of rock types ( igneous, metamorphic, and sedimentary) and demonstrate the similarities and differences using the rock cycle model.

### **Materials needed:**

1. A collection of rocks and minerals.
2. A magnifying glass for each student.
3. Chart paper for recording observations.
4. Small cards to write an observation for sorting.
5. Pieces of paper with large shapes for grouping the specimens.

### **Procedure:**

1. Lay out specimens
2. Ask the students to look closely at the specimens and to think of words or phrases that could be used to describe the specimens.
3. Record their words ( here are a few significant observations you can throw in if they don't mention them: made of one " thing", made of two or more " things", tiny grains, no grains, pieces of other rocks ( or fossils), regular shape, irregular shape).
4. Choose one of the observations. Write it on a card. Lay the card next to or inside one of the large paper shapes.
5. Place all the specimens that fit that observations inside that shape.
6. Choose another observation. Write it on another card. Repeat the process above, laying the specimens inside the large shape.
7. **Note if specimens move from one large shape to another overlap the shapes like a venn diagram.** Place the specimens that " moved" in the overlapping space.
8. Have the students repeat this activity in groups.
9. Check for understanding by observing how each group sorts their specimens and why.

## **Rocks vs. Minerals lesson 2**

### **Notes to the teacher:**

In this lesson students will continue their visual assessment to distinguish between those rocks that appear to be made of one substance, vs. those that appear to have more than one. This leads to the distinction that indicate the different types of rocks:

**igneous, sedimentary, and metamorphic.** Students come to label each type of rock only after they have worked with the specimens and determine the various qualities.

**Grade level:** 6 th grade

### **Objectives:**

1. The students will be able to label the distinction between rock and mineral (rock: made of two or more minerals, mineral: made of single element or compound, same throughout)
2. The students will be able to observe and draw conclusions about the visual distinctions between rocks and minerals.
3. The students will be able to experience the three types of rocks: igneous, sedimentary and metamorphic.

### **Benchmarks:**

**S.IP.06.11.** Generate scientific questions based on observations, investigations, and research.

**S.IP.06.15.** Use tools and equipment appropriate to scientific investigation.

**S.IA.06.13.** Communication and defined finding of observations and investigations using evidence.

**E.SE.06.41.** Compare and contrast the formation of rock types ( igneous, metamorphic, and sedimentary) and demonstrate the similarities and differences using the rock cycle model.

### **Materials needed:**

1. A collection of rocks and minerals.
2. Cards with descriptions for various minerals or rocks.
3. Large shapes for grouping the various specimens.
4. Magnifying glasses

### **Procedure:**

Today we're going to look for specimens that fit certain descriptions that are written on these cards. They will help us learn the differences between rocks and minerals.

1. Pull out one shape and the card that reads: "Appears to be made of more than one substance."
2. Have students choose specimens that fit that description and place them inside the shape.

What do you think the different substances could be? (rocks, fossils, minerals)

3. Pull out another shape and the card that reads: "Appears to be made of only one substance."
4. Have students choose specimens that fit that description and place them inside the shape.
5. Ask the students if any of the specimens look like the substances in the first group? (Students should note the presence of quartz, microcline, feldspar, etc.)
6. Tell the students that the specimens in the second group are minerals. Minerals are made of just one substance and are the same throughout. If you cut them into pieces they would have exactly the same composition in each piece.
7. Tell the students that the first group is a group of rocks. Rocks are made of at least two substances. Sometimes the substances are tiny grains of sand. Sometimes they are fossils. Sometimes they are different minerals.

### **Conclusion:**

As students are working walk around the room giving them an oral assessment. Make sure the students are having good conversation and help with any misconceptions you come across.

After they have completed both activities in groups give the students a simple exit slip.

### **Example of an exit slip:**

1. What is a mineral?

2. What is a rock?
3. What are some ways to classify rocks and minerals?

**References :**

WWW. [rocksandminerals4u.com](http://rocksandminerals4u.com)