



# Properties of Rocks and Minerals

Have you ever wondered what rocks are made of? Rocks are made of one or more minerals. A mineral is a solid. Some minerals are elements and are made of only one kind of **atom**. Other minerals are compounds and are made of at least two different elements joined together.

Each mineral has a definite **structure** and is formed naturally. A mineral is not alive and it does not form from anything that was once alive. Gold is a mineral. But coal is not a mineral because it forms from decaying plant and animal material.

---

**atom** – the smallest whole unit of matter

**structure** – the orderly arrangement of atoms

A rock can be made of just one mineral. But most rocks are made of a **mixture** of minerals. Different minerals come together to form a specific type of rock. Look at the granite rock on this page. You can see that there are different minerals in it.

▼ **Granite is a mixture of minerals.**

**mixture** – something made of two or more different things



**KEY IDEA** Rocks are made of minerals.

# Identifying Minerals

Look at the rocks in these pictures. Each rock is made of the mineral quartz. How would you describe these types of quartz? You might say they are pink, purple, orange, and brown. When you describe the colors of the quartz, you are telling about its **properties**.

Properties help us identify, or name, minerals. For example, color is a property of minerals. The rose quartz mineral in the picture has a pink color.

But some minerals, such as quartz, come in many colors. Also, different minerals can sometimes have the same color. For example, the minerals gold and pyrite have almost the same color. For these reasons, sometimes other properties must be used to identify minerals.

**properties** – qualities that can be observed or measured

► **These types of quartz all have different colors.**





Some minerals are identified by a property called **streak**. A streak is the powdery mark that some minerals leave behind when they are rubbed on special tile. The color of the streak may be different from the color of the mineral. For example, if you rub gold and pyrite across white tile, each leaves a different streak of color. The streaks help tell these two minerals apart.



▲ Gold and pyrite leave different streaks.

Another property called **luster** tells how a mineral reflects light. **Hardness** is a property of minerals that measures how easily a mineral can be scratched.

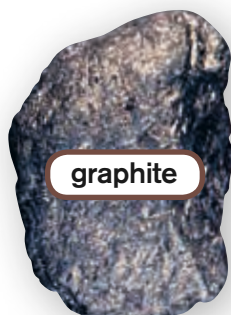
**streak** – the powdery mark left when some minerals are rubbed across a surface

**luster** – a property that describes how a mineral reflects light

**hardness** – a property of minerals that measures how easily a mineral can be scratched

## BY THE WAY...

Pyrite is often called “fool’s gold” because so many people are fooled into thinking it is real gold.



◀ Graphite has a shiny luster.



▲ A diamond is the hardest mineral.



# Identifying Rocks

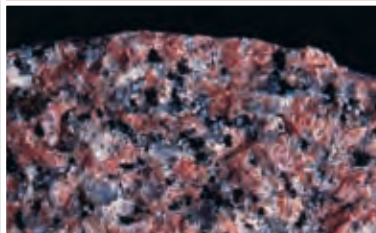
You know that rocks, such as granite, can be identified by the minerals they contain. But rocks can be identified in other ways, too.

Sometimes rocks can be identified by how the pieces of mineral in a rock fit together. Many times, the minerals in rocks fit together to make the rock look like one solid piece. Other times, a rock looks like it is made of chunks or pieces that are stuck together.

**Texture** also helps identify some rocks. Texture is based on the size and shape of the material that makes up the rock. If a rock looks and feels bumpy, its texture is rough. If it looks and feels smooth, its texture is glassy.

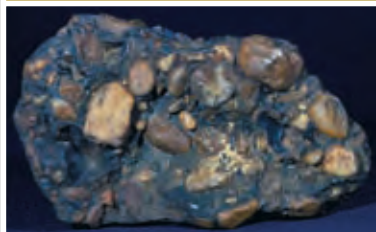
**texture** – a property that is based on the size and shape of the material making up the rock

## Minerals



**Granite has minerals that are easily seen.**

## Fit



**Conglomerate rocks look chunky.**

## Texture



**Obsidian is a rock with a glassy texture.**

**KEY IDEA** Properties help identify minerals and rocks.

# How Rocks Form

You have seen how properties help identify rocks. But where do rocks get these properties? Rocks get their properties from how they are formed. Rocks are classified into three main groups according to how they form.

The three groups of rock are **igneous rock**, **sedimentary rock**, and **metamorphic rock**. All rocks can be put into one of these three groups.

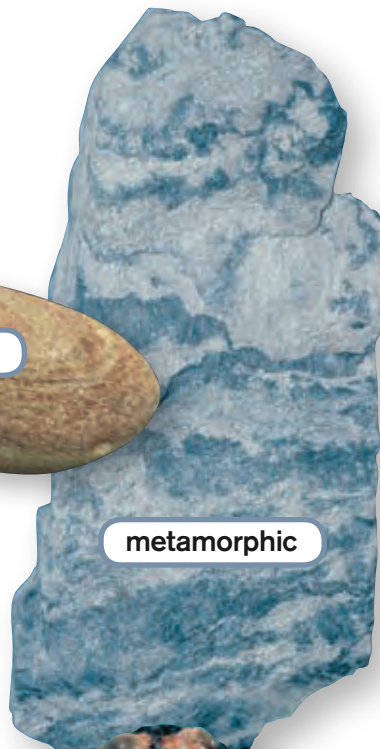
**igneous rock** – rock formed when hot, melted rock cools

**sedimentary rock** – rock formed when tiny pieces of rock and other particles get squeezed together

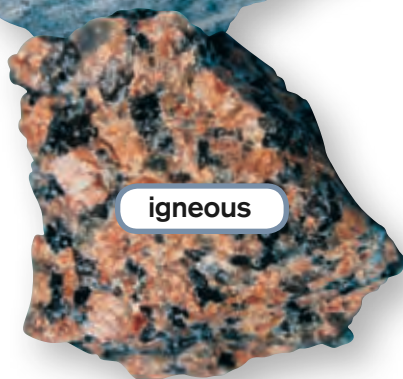
**metamorphic rock** – rock formed when extreme heat and pressure change one type of rock into another



sedimentary



metamorphic



igneous

**KEY IDEA** Rocks are classified according to how they form.

Igneous rock forms when melted rock, or **magma**, begins to cool. Hot magma rises from within Earth. As it makes its way toward the surface, it cools and hardens. Igneous rock can form underground in this way.

Sometimes magma reaches the surface of Earth through a volcano. The melted rock that comes out of a volcano is called **lava**. As lava cools and hardens, igneous rock is formed above ground.

**magma** – hot, melted rock under Earth’s surface

**lava** – hot, melted rock that reaches Earth’s surface

▼ **When lava cools, igneous rock is formed.**

### Explore Language

**Igneous** is from a Latin word, *ignis*, which means “fire”.





# Sediments Pile Up

Sedimentary rock forms in a different way. Over thousands and thousands of years, little bits of rock are broken down and carried away. These little bits of rock and other sediments begin to pile up in layers. Over a long period of time, the weight of the top layers puts pressure on the bottom layers. The bottom layers begin to stick together and then harden into sedimentary rock.

Chalk is a sedimentary rock formed from tiny parts of living things that once lived in the oceans. Over millions of years, the tiny parts piled up on the ocean floor and formed chalk.

**sediments** – tiny pieces of rock and other particles that are carried from one place to another

▼ **The chalk cliffs in Dover, England are sedimentary rock.**

▼ **Fossils, or signs of life in the past, are often found in sedimentary rock.**

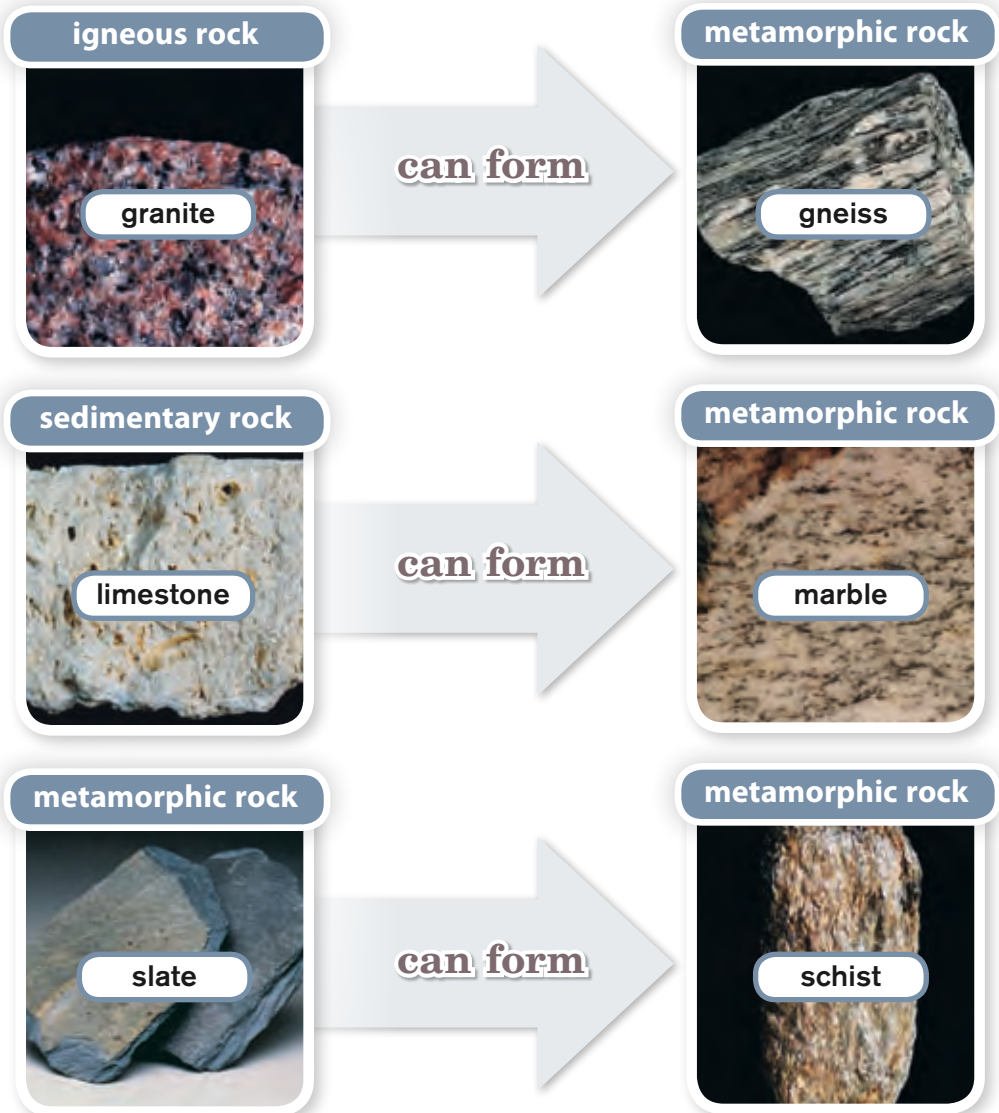


**SHARE IDEAS** Tell why you think sedimentary rock usually holds the best fossils.



# Heat and Pressure

Sometimes extreme heat and pressure can change rocks. Chemical processes within Earth can also cause change. When one type of rock changes into another type of rock, metamorphic rock forms. Metamorphic rock can form from igneous, sedimentary, or even other metamorphic rocks.



# The Rock Cycle

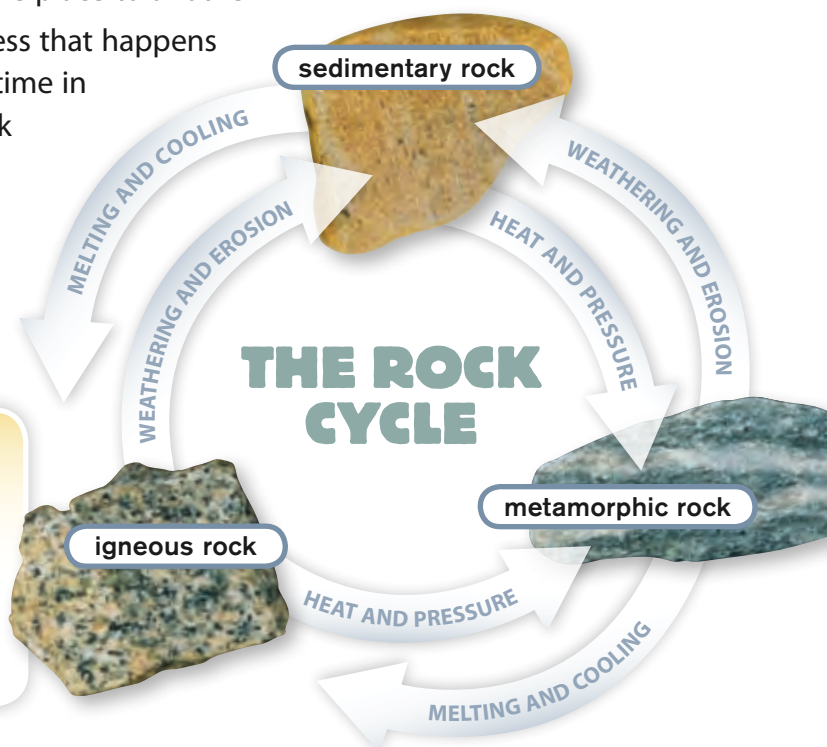
One of the most interesting things about rocks is that they are constantly changing. On the surface of Earth, rocks are constantly breaking down and being moved through **weathering** and **erosion**. Deep within Earth, rocks are constantly melting and going through other changes caused by heat, pressure, and chemical processes.

This never-ending cycle of change is called the **rock cycle**. Although it happens over a very long period of time, the rock cycle means that rocks never stay the same.

**weathering** – how rocks break down and change

**erosion** – the movement of rocks and other particles from one place to another

**rock cycle** – the process that happens over a long period of time in which one type of rock changes into another type of rock



**KEY IDEA** Rocks constantly change from one type to another in the rock cycle.