

FROM MINERAL TO ROCK

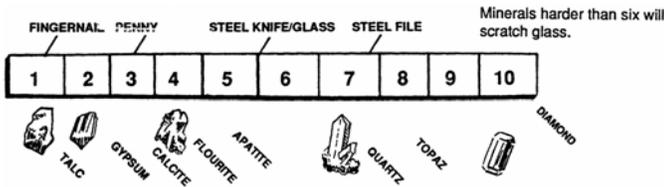


Minerals are made of atoms (tiny particles) from different elements such as oxygen, carbon, lead and silicon. The atoms form simple patterns that give mineral crystals characteristic shapes. The hidden pattern of the packed together atoms is always the same in any particular mineral. Minerals can be identified by their color, density, hardness and shape.

Color: Streak is a mineral's color in powder form. It can be seen when the mineral is scraped across a tile.

Density: This is the mineral's weight per unit volume. Water is assigned a density of 1 and the specific density measurements of other materials are compared to it. A mineral fragment that weighs 2.1 times as much as an equal volume of water has a density measurement of 2.1.

Hardness: A mineral's hardness is one of the most useful identification tools. The hardness scale looks like this:



Shape: A mineral's shape (also called "habit") can be a useful clue to a mineral's identity. Each shape has a specific name. For example, copper is dendritic. It is made up of thousands of tiny crystals forming a branching growth. Salt forms cube-shaped crystals and quartz forms six-sided crystals.

Cleavage: This is the surface along which a mineral has the tendency to break. The number of cleavage planes and the angles between them can provide useful clues to identification of minerals.

Luster: Luster is the gloss of a mineral's surface. It is determined by the way light is reflected from a mineral.

MINERALS ALL AROUND US

Minerals are all around us. They are used to make many of the products we use everyday. Minerals provide us with the metals that help us make cars, aircraft, jewelry and coins. Below is a list of other items we use that are made of minerals:

lead pencils (graphite)

fertilizer (potassium, sodium, calcium)

chalk (gypsum)

flashbulb (zirconium)

window glass/mirrors (silica)

table salt (halite)

Minerals that concentrate into deposits from which one or more minerals and rocks may be extracted are called ores. In Michigan, iron ore (hematite) is mined in the Upper Peninsula. The earliest commercial deposits were found in Marquette County in 1844. Until about 1900, Michigan was the leading producer of iron ore in the United States.

Another mineral that brought attention to Michigan was the "native copper" deposits of the Keweenaw Peninsula in the western Upper Peninsula. This region became world famous when Michigan was the leading producer of copper in the U.S. between 1847-1887. This deposit is unique because the copper is not combined with other elements.

THE BUILDING BLOCKS OF ROCK

Minerals are the building blocks of rocks. Nature cements combinations of minerals together to form rocks. Rocks are categorized in three general groups according to the way they were formed. These groups are:

IGNEOUS ROCKS: Igneous rocks are not all one kind, so they are put into two sub-groups according to the manner and place in the earth where they were formed.

Intrusive igneous rocks were formed by molten rock, called magma, forced from the earth's interior into a cooling part of the earth's crust. As they cooled, their minerals formed large crystals. To summarize, intrusive rocks are those that were pushed into other rocks.

Extrusive igneous rocks are formed when magma is forced to the earth's surface as a result of volcanic activity.

SEDIMENTARY ROCKS: Sedimentary rocks are formed when loose sediment accumulates in layers that become cemented together. Sediment is material that comes from the wearing away of rocks caused by weathering affects. Two types of weathering affects create sediments.

Mechanical weathering breaks down rocks into particles without changing the identities of the minerals in the rock. Ice is an important agent of mechanical weathering. Water seeps into the cracks and pore spaces of the rock. It expands when it freezes, forcing the cracks to widen. This results in pieces of rock being broken off. Heating and cooling of rock also contributes to mechanical weathering.

Chemical weathering is the wearing away of rock by chemical reaction. In this process a rock's minerals are divided into finer particles that can be easily carried by the wind. Air and water are involved in many chemical reactions.

Wind, water and ice transport weathered sediment. These agents of transportation reduce the size of the sediment particles and deposit them in new locations. Common sediments include mud, gravel, sand and silt. Sedimentary rocks can be classified into three groups.

Clastic sedimentary rock is made of transported fragments from pre-existing rock. Examples of this type of rock are sandstone and shale.

Carbonate sedimentary rock is abundant in Michigan. Limestone is an example of this type of sedimentary rock.

Evaporite sedimentary rock is formed by the evaporation of salt water. Two examples of this type of rock are salt and gypsum.

METAMORPHIC ROCKS: Metamorphic rocks are rocks that have gone through a chemical, mineral or structural alteration due to a change in their surroundings. The change usually takes place deep within the earth and is caused by high temperature and pressure. Examples of this type of rock include slate that was once shale and marble that was once limestone or dolomite.

ROCK HUNT

Ask each of the children in your group to find an unusual rock. This can be done at home in their backyards, at recess in the playground or on a family vacation or weekend outing. Ask them to complete the "Rock Hunt Report" worksheet.