

# Rocks and Minerals



## 23. What kind of rock or mineral is this?

Most libraries have books that can help you identify rocks and minerals. Professional geologists and experienced amateurs such as rock hounds may also be able to help you.

There are thousands of different rocks and minerals and probably several hundred common ones. Most public libraries have books on rocks and minerals. The first step in identifying a specimen is to closely examine it (including under a magnifying glass) and compare it to the descriptions and pictures in a book. You may need to look at a fresh surface—one not changed by weathering—which may require breaking the specimen.

A second alternative for identifying a rock or mineral is to have a trained non-professional (e.g., a rock hound) or professional geologist examine the specimen. Many of these individuals have seen a wide variety of rocks and minerals and might be able to identify it. They also may have knowledge of special tests that can be done on the specimen and/or have special testing equipment. Where the specimen was found may be helpful in identifying it. OGS geologists are willing to examine, and can usually identify, hand samples of specimens brought or mailed to them.

A third method, generally somewhat costly, is to cut one or more thin sections (30-micron-thick transparent slices of the specimen) and examine them under a petrographic microscope. Rocks and minerals also can be identified using a variety of techniques such as wet-chemical analyses, X-ray diffractometry, and scanning electron microscopy.

Precious metals may be detected by assaying the sample, but Oklahoma has no assay labs. To locate out-of-state assayers, use the Internet yellow pages. Most large western cities (e.g., Denver, Tucson, Salt Lake City) list several companies under the business category "assayers." Assay methods generally are definitive but require extensive sample preparation, sophisticated equipment, and trained personnel.

## 24. Why are there so many red rocks in Oklahoma?

Many rocks contain iron oxide minerals—"rust"—because ancient climates favored their formation.

Most of the red rocks in Oklahoma are Permian in age (290 to 245 million years ago). Permian rocks cover most of the western part of the State, except for the Wichita Mountains and western Panhandle. Most of the red color is caused by the mineral hematite ( $\text{Fe}_2\text{O}_3$ ), an iron oxide. The hematite occurs as a thin coating on the individual mineral grains that make up the rocks, and in some cases it also forms a weak cement binding individual grains together. Only 2–3% of the rock is iron oxide, but that is enough to stain it red. Much of the hematite probably was deposited as part of the sediment that makes up the rock, but some may have formed after sediment deposition as an alteration product of other iron minerals.

During Permian time in Oklahoma, the climate was monsoonal; the alternating periods of wet and dry promoted the oxidation of iron in soil and sediments. In addition, most of the red Permian sediments were deposited in rivers, streams, floodplains, and nearshore marine environments, all of which would have been subjected to periodic drying resulting in the formation of hematite.