

Metamorphic Rocks

Chapter 1

Metamorphic rocks are the third major group in the rock cycle. Metamorphic rocks change from igneous, sedimentary, and metamorphic rocks into new metamorphic rocks. The new rocks have minerals that are stable at the new heat and pressure. The minerals in high grade metamorphic rocks migrate within the rock when they recrystallize. The gneiss in the picture is a high-grade metamorphic rock.

Where metamorphic rocks form

You will also be learning about the regional and contact metamorphism that creates these new metamorphic rocks. These forces are occurring today as the crustal plates on our planet move around. All of the changes that take place occurred when they are still a solid rock. Rocks heated until they totally melt become igneous rocks. Migmatites are rocks that contain both igneous and metamorphic rock material.



Gneiss, Healy, AK

Changes in shape and form

The term metamorphic comes from the Greek word *meta* meaning change and *morpho* meaning shape. You will be learning about how these rocks change their structure as minerals recrystallize. Notice the bands of light and dark minerals in the gneiss located in the picture.

ID Metamorphic Rocks

Migrating minerals form bands

The minerals recrystallizing in the rock migrated to form bands of light and dark minerals. The rock was deep underground and subjected to extreme heat and pressure when the minerals recrystallized and migrated.

Prior to forming a metamorphic rock, the interlocking minerals were scattered throughout the rock in random order. The original minerals crystallized when magma, molten rock, cooled beneath a volcano.

Limestone and sandstone recrystallize

Marble and quartzite are two massive metamorphic rocks that form when limestone and sandstone recrystallize. Anthracite coal and graphite also are massive metamorphic rocks that form under high temperature and pressure. These rocks do not have layers and when broken they fracture instead of breaking between layers. You will learn more about these and other fascinating rocks in this unit.



Garnets collected by children near Wrangell Island, AK MLM

Garnet ledges owned by children of Wrangell, Alaska

The children of Wrangell Island own the ledges where the garnets in the picture were collected. The ledges were

Flattening Minerals

Activity 2

Introduction

Minerals in metamorphic rocks recrystallize when heat and pressure are applied to the rocks during collisions between crustal plates. In this activity you will see how minerals form layers perpendicular to the pressure applied to the rocks.



Materials

- Modeling clay (3 different colors)
- Flat objects that can be used in this experiment (Paper clips, pennies, old buttons and any other small objects that are flat)
- Block of wood or a piece of plastic to flatten and scrape the clay
- Wax paper

Directions

1. Collect all the materials needed for this activity.
2. Place your materials on a sturdy table where you can conduct the experiment.

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