

Types of Rocks

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Printed: November 2, 2014

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CHAPTER 1

Types of Rocks

Lesson Objectives

- Define rock and describe what rocks are made of.
- Know the three main groups of rocks.
- Explain how each of these three rock types are formed.
- Describe the rock cycle.

Vocabulary

- deposited
- sediments

Introduction

There are three major rock types. Rock of any of these three rock types can become rock of one of the other rock types. Rock can also change to a different rock of the same type. Rocks give good clues as to what was happening in a region during the time that rock formed.

The Rock Cycle

All rocks on Earth change, but these changes usually happen very slowly. Some changes happen below Earth's surface. Some changes happen above ground. These changes are all part of the rock cycle. The rock cycle describes each of the main types of rocks, how they form and how they change. **Figure 1.1** shows how the three main rock types are related to each other. The arrows within the circle show how one type of rock may change to rock of another type. For example, igneous rock may break down into small pieces of sediment and become sedimentary rock. Igneous rock may be buried within the Earth and become metamorphic rock. Igneous rock may also change back to molten material and re-cool into a new igneous rock.

Rocks are made of minerals. The minerals may be so tiny that you can only see them with a microscope. The minerals may be really large. A rock may be made of only one type of mineral. More often rocks are made of a mixture of different minerals. Rocks are named for the combinations of minerals they are made of and the ways those minerals came together. Remember that different minerals form under different environmental conditions. So the minerals in a rock contain clues about the conditions in which the rock formed (**Figure 1.2**).

Three Main Categories of Rocks

Geologists group rocks based on how they were formed. The three main kinds of rocks are:



FIGURE 1.1

The rock cycle.



FIGURE 1.2

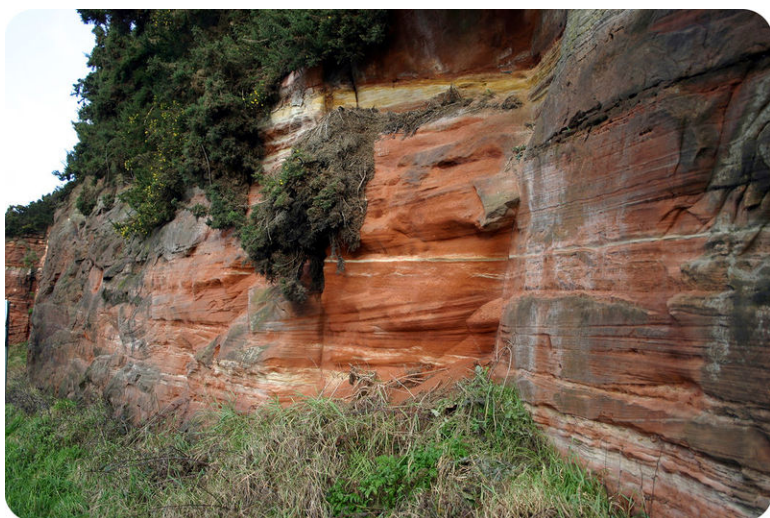
Rocks contain many clues about the conditions in which they formed. The minerals contained within the rocks also contain geological information.

1. Igneous rocks form when magma cools below Earth's surface or lava cools at the surface (**Figure 1.3**).
2. Sedimentary rocks form when sediments are compacted and cemented together (**Figure 1.4**). These sediments may be gravel, sand, silt or clay. Sedimentary rocks often have pieces of other rocks in them. Some sedimentary rocks form the solid minerals left behind after a liquid evaporates.
3. Metamorphic rocks form when an existing rock is changed by heat or pressure. The minerals in the rock change but do not melt (**Figure 1.5**). The rock experiences these changes within the Earth.

Rocks can be changed from one type to another, and the rock cycle describes how this happens.

**FIGURE 1.3**

Lava is molten rock. This lava will harden into an igneous rock.

**FIGURE 1.4**

This sandstone is an example of a sedimentary rock. It formed when many small pieces of sand were cemented together to form a rock.

Processes of the Rock Cycle

Any type of rock can change and become a new type of rock. Magma can cool and crystallize. Existing rocks can be weathered and eroded to form sediments. Rock can change by heat or pressure deep in Earth's crust. There are three main processes that can change rock:

- **Cooling and forming crystals.** Deep within the Earth, temperatures can get hot enough to melt rock. This molten material is called magma. As it cools, crystals grow, forming an igneous rock. The crystals will grow larger if the magma cools slowly, as it does if it remains deep within the Earth. If the magma cools quickly, the crystals will be very small.
- **Weathering and erosion.** Water, wind, ice, and even plants and animals all act to wear down rocks. Over time they can break larger rocks into smaller pieces called sediments. Moving water, wind, and glaciers then carry these pieces from one place to another. The sediments are eventually dropped, or **deposited**, somewhere. The

**FIGURE 1.5**

This mica schist is a metamorphic rock. It was changed from a sedimentary rock like shale.

sediments may then be compacted and cemented together. This forms a sedimentary rock. This whole process can take hundreds or thousands of years.

- Metamorphism. This long word means “to change form.” A rock undergoes metamorphism if it is exposed to extreme heat and pressure within the crust. With metamorphism, the rock does not melt all the way. The rock changes due to heat and pressure. A metamorphic rock may have a new mineral composition and/or texture.

An interactive rock cycle diagram can be found here: http://www.classzone.com/books/earth_science/terc/content/investigations/es0602/es0602page02.cfm?chapter_no=investigation

The rock cycle really has no beginning or end. It just continues. The processes involved in the rock cycle take place over hundreds, thousands, or even millions of years. Even though for us rocks are solid and unchanging, they slowly change all the time.

Lesson Summary

- There are three main types of rocks: igneous, sedimentary, and metamorphic.
- Melting and later cooling, erosion and sedimentation, and metamorphism transform one type of rock into another type of rock or change sediments into rock.
- The rock cycle describes the transformations of one type of rock to another.

Lesson Review Questions

Recall

1. What is the difference between magma and lava?
2. What are igneous rocks? How do igneous rocks form?

3. What are metamorphic rocks? How do metamorphic rocks form?
4. What are sedimentary rocks? How do sedimentary rocks form?

Apply Concepts

5. How do minerals combine to form an igneous rock?
6. How do minerals combine to form a metamorphic rock?
7. How do minerals combine to form a sedimentary rock?

Think Critically

8. What clues do the minerals in an igneous rock give about how the rock formed? A metamorphic rock? A sedimentary rock?
9. Describe how an igneous rock can change to a metamorphic rock.
10. If Earth's interior was cool, how would this change the types of rocks formed on Earth?

Points to Consider

- What processes on Earth are involved in forming rocks?
- What rocks are important to modern humans and for what purposes?

References

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