

Chapter 4- Rocks: Mineral Mixtures

Section 1: The Rock Cycle

Objectives

1. Describe two ways rocks have been used by humans.
2. Describe four processes that shape Earth's features.
3. Describe how each type of rock changes into another type as it moves through the rock cycle.
4. List two characteristics of rock that are used to help classify it.

Many of us work hard to recycle the items we use in our daily lives to reduce the impact we have on the environment. In a way, the Earth also recycles through the rock cycle. Can you imagine what a rock might look like through each stage of the rock cycle?

How do rocks differ from minerals?

minerals combine to form rocks

What are rocks?

a naturally occurring, solid mixture of one or more minerals

What are rocks used for?

tools, buildings, roads

Rocks are made through a ROCK CYCLE.

Rock Cycle

a series of processes in which rocks continuously change from one type of rock to another

Processes That Shape the Earth

Sedimentary Rocks

Uplift

process by the Earth that causes rocks to rise to the surface

Weathering

water, wind, ice and heat break down rocks into sediments

chemical weathering

the minerals in rocks are dissolved into rainwater or changed from one type of mineral into another

warm, moist environments have more chemical weathering because water is needed for the chemical changes and warmth facilitates the reactions.

physical weathering

rocks are mechanically broken apart into smaller pieces

if water freezes into cracks in a rock it will expand as it freezes, opening the crack even more.

Erosion

transportation of sediments from one location to another

Deposition

material is placed down after erosion occurs

Sediments

small pieces of broken down rock, mineral fragments

Lithification

process of sediment becoming a rock

sediment that has formed, been transported, and deposited, is not a sedimentary rock unless it is all bound together

Cementation

sediments become cemented together

Compaction

sediments becoming squeezed together

Metamorphic Rock**Heat/Pressure/Chemical Reaction (rxn)**

soften and squeeze the rock

Igneous Rock**Heat**

soften rock

Melting

rock melts into molten material (melted rock)

Magma

melted rock

Cooling

magma begins to cool and mineral crystals begin to join together

Solidification/Crystallization

cooled magma hardens and becomes a solid

Rocks are further classified by composition and texture.

composition

chemical makeup of a rock

describes the mineral or other materials in the rock

texture

based on the sizes, shapes, and positions of the rock's grains

fine-grained

need magnifying glass or microscope

to see mineral grains

medium-grained

small mineral grains but can see mineral grains

coarse-grained

large mineral grains

Sedimentary rocks can have all grain types.

Igneous rocks have fine or coarse-grain types.

Do you think rocks that cooled and solidified from lava on Earth's surface would look different from those that cooled and solidified from magma inside the Earth?

Why?

How do volcanic eruptions affect people?

How do people benefit from volcanic eruptions?

lava forms land

lava soil is some of the most fertile soil in the world

Igneous Rocks

igneous = fire

rocks form when **magma or lava** cools and solidifies

magma forms:

when rock is heated

when pressure is released

when rock changes composition

formation of different igneous rocks depends on how long it takes for the magma or lava to cool and the composition of the magma or lava

Felsic

light-colored igneous rocks

Mafic

dark-colored igneous rocks

Intrusive Igneous Rock

rock formed from the cooling and solidification of magma beneath the Earth's surface

mostly coarse-grained texture

Plutons - Figure 4

large, irregular-shaped intrusive bodies

Batholiths

largest of all bodies

Laccoliths

dome shaped bodies that push up on the underneath surface

Stocks

smaller than the batholiths

Dikes

intrusions that cut across moving in a vertical directions

Sills

located parallel to other rock

Volcanic Neck

hardened core of a volcano that is left behind after the volcano erodes away

Extrusive Igneous Rock

lava that cools and solidifies on or near the Earth's surface

Fissures

cracks in the Earth's surface where lava flows, cools and hardens

Lava Plateau

over-flow of lava in a fissure that covers a large section of the Earth's crust

Sedimentary Rocks

How are layers in a sedimentary rock similar to the rings in a tree?

How are they different?

Sedimentary Rocks

75 % of Earth's surface = sedimentary rocks

form from sediments become pressed together or cemented together = **lithification**

sediments = loose material

ex: rock fragments or mineral grains

weathering -- process that breaks rocks into pieces

erosion -- moves sediments to a new location

deposition- laid down or dropped out of the liquid

strata - layers in the sedimentary rocks

stratification - process in which sedimentary rocks are arranged in layers

Two ways sedimentary rocks form

*** Compaction**

layer on layer -- pressure --sediments stick together

*** Cementation**

Water soaks through sediments
quartz and calcite dissolves and
acts as a cement sediments
stick together

Classification of Sedimentary Rocks

1. Clastic

* made of broken fragments

breccia = sharp angles

conglomerate = rounded angles

2. Chemical

* minerals dissolve in solution (HCL)

ex: rock salt

* limestone -- fossils, usually deposited on the ocean floor

3. Organic

* rocks form from remains of living items

ex: fossil rich limestone

chalk is made from tiny marine creatures

Metamorphic Rocks

Metamorphic Rocks

meta = change

morphos = shape
formed from heat and pressure
mineral grains can flatten

Two classes of Metamorphic Rocks

1. Foliated

* mineral grains flatten and line up in parallel bands
example: gneiss from granite (igneous)

2. Nonfoliated

* mineral grains change but do not form bands
example: marble from limestone (sedim)

Explain why marble rarely contains fossils even though limestone does.