

CHAPTER - 8

ROCKS AND MINERALS

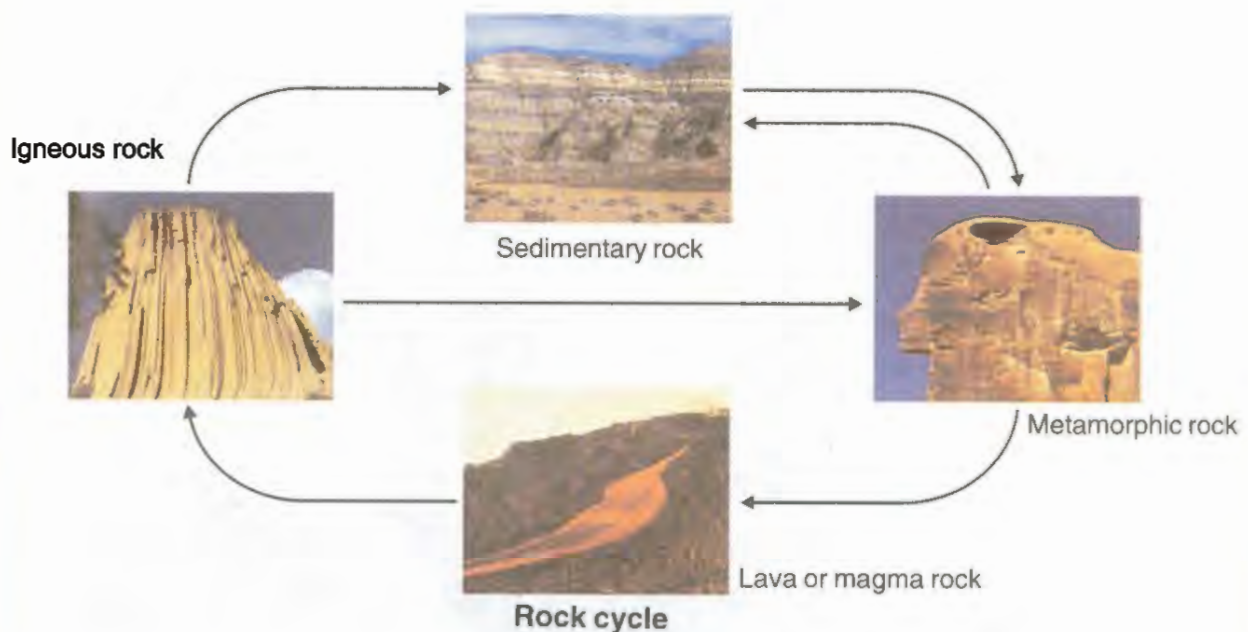
The ground we walk on, build on and grow gardens on is made up of rocks. All the rocks in the world are made up of chemicals called minerals. Granite, sandstone, chalk, marble and slate are all different types of rocks. The pebbles you find on the beach are rocks that have been worn down and smoothed by the action of the sea. The stones that are used to build structures from small cottages to magnificent cathedrals are rocks. All rocks are not hard. Clay is a type of soft rock.

A rock may be defined as any natural mass of mineral matter that makes up the earth's crust.

Types of Rocks

There are three main types of rocks:

1. Igneous
2. Sedimentary and
3. Metamorphic.



Igneous rocks

You know that deep down inside the earth, it is still very-very hot. The fiery hot substance inside the earth is called magma. In a volcano, the magma pores out in a molten stream. The molten magma, when cools and solidifies, forms a rock. Such rocks which are formed from fiery-hot magma are called igneous rocks. Igneous means fire-formed.



Formation of igneous rocks

Magma is a mixture of different minerals. These minerals occur in different proportions. So, igneous rocks contain different minerals. Such as granite and basalt.



Granite : Granite is an intrusive igneous rock. There are several types of granite, but all are light coloured because of the light coloured minerals within them. Many temples in south India have been made of granite.

Basalt : Basalt is a typical extrusive igneous rock formed from lava. It is dense and dark because of the minerals it contains. It is fine grained because of its quick cooling.

Igneous rocks tend to be very hard. When broken up, they make a good, strong road surfacing material especially when coated with tar.

Sedimentary rocks

Igneous rocks are slowly broken down by wind, rain and water. In due course, they crumble into tiny bits.

Rivers carry these tiny bits of rocks into the sea. The rocky material along with sea shells and skeletons of tiny sea animals settles in layers upon



Formation of sedimentary rocks

the sea bottom. These materials are called sediments. As the time passes by, new layers are laid over the old ones. The weight of the sea water and top layers squeezes the layers into solid rocks. Such rocks are called sedimentary rocks.

The layers of sedimentary rocks may not always be levelled. Some layers are tilted or folded. Sandstone, limestone, shale and rock salt are examples of sedimentary rocks. Chalk is also a sedimentary rock. It is nothing but soft limestone.



Sandstone

Sandstone : Sandstone is made from layers of sand in deserts, or on sea beaches, which have been naturally cemented together. The redrock of Devon, England is a typical sandstone. Sandstones are commonly used as building material. The Red Forts at Delhi and Agra are made up of red sandstones. Many buildings in Jaipur are built of sandstones and so Jaipur is also known as 'Pink City'.

Limestone : Limestone is a biogenic rock. It is made up of living material. The shelly limestone is made up of broken sea shells. Other examples of biogenic sedimentary rocks are reef limestone and coal. Limestone is also a hard rock and is, commonly, used as a building material.



Shelly limestone

Shale : Shale is formed of compressed mud, silt and clay, mostly due to pressure. Shale rock is made up of parallel layers which readily split into pieces.



Shale

Rock Salt : Sea water contains dissolved minerals. When an area of sea dries out, these minerals are deposited as a layer in the bottom. Rock salt is a typical chemical sedimentary rock.

Chalk : Chalk is made up of millions of tiny calcium carbonate (lime) skeletons.

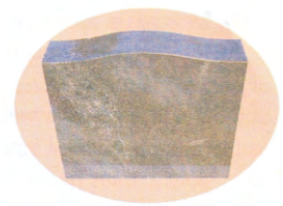
Fill in the blanks :

- Limestone is a _____ rock.
- Shale is formed of _____, _____ and _____.
- Sandstones are commonly used as _____.

Metamorphic Rocks

Metamorphic rocks are changed rocks. The intense heat and pressure inside the earth changes the igneous and the sedimentary rocks into metamorphic rocks. Metamorphosis means change. The characteristics of the changed rock are different than the parent rock due to the changes in the mineral contents of the rock. Shale and marble are the main examples of metamorphic rocks. **Gneiss** and coal are other examples of metamorphic rocks.

Slate : Slate is a dark grey and shiny rock. It is formed by the metamorphosis of shale. It splits easily into thin slices. Slate is used as a roofing material and a chalkboard surface.



Marble : Marble is a type of thermal metamorphic rock, formed when heat is applied on limestone. It is a smooth rock. It is an attractive building and sculpting material. It is also used in making statues, table tops and various other items. Its colour can vary from white to white streaked with brown, red, green or grey.



Gneiss : Gneiss pronounced 'nice' is the highest grade of regional metamorphic rock. It is a rock with a coarse texture and has parallel light and

dark streaks and bands of minerals next to each other. It is found in grey, pink, black and red colours.

Coal : Coal is a rock formed by the metamorphosis of the remains of plants under the earth. Heat and pressure expel out moisture, gases and other matter from these remains of plants, leaving behind carbon in different amounts. Superior quality of coal has more carbon, while low quality coal contains less carbon in it. Coal is black because of presence of carbon in it.



Coal is used as a fuel in powerhouses to produce electricity, in the extraction of iron and in many refineries. Coal gives us many useful products such as coal tar, coal gas ammonia and coke. Coal tar is used for constructing roads.

Minerals

Minerals are the building blocks of rocks. All the rocks, igneous, sedimentary or metamorphic, are composed of minerals.

A mineral is a chemical compound that occurs naturally. Each different mineral is made up of crystals of a particular chemical. Minerals can be identified by their hardness, colour, the way they reflect light, the way they break and their density.

Minerals making up igneous rocks include quartz, plagioclase and olivine. Augite is found in metamorphic rocks. Dolomite makes up limestone sedimentary rocks. Quartz is a very common mineral.

How Minerals are Formed ?

All minerals are originally formed from hot magma. When the magma cools, crystals of minerals appear. These crystals first may sink in the magma so that the composition of the magma changes with depth. Thus, a sequence of minerals is formed in the rocks as the magma cools. Lighter minerals occur

above the denser minerals. If the crystals form slowly, they may form gemstones.

Ores and Gemstones

Many useful metals are formed in rock or mixed with loose rock materials. Such mixtures are called metallic ores. Metals like iron, zinc, copper and aluminium are extracted from their ores. Gold is formed as a native metal. Thus, the treasure of different metals is hidden in rocks.

A gemstone is a mineral which is especially beautiful and rare. Gems and precious stones like diamonds and rubies are also found in rocks. Diamond is the hardest known naturally occurring substance. Talc is one of the softest minerals.

Apart from all these, the rocks contain other useful minerals. These minerals make the soil fertile. Minerals like nitrates, phosphates, sulphates and potassium salts are used as fertilizers. They ensure a good yield of crops.

Petroleum

Petroleum is a valuable mineral oil found in rocks underground. Huge petroleum oils are found under the sea.

It is believed that petroleum was produced millions of years ago by the bacterial decomposition of animals and plants which were buried underground to great depths in the earth's crust.

From petroleum, we get petrol, kerosene oil, diesel oil, paraffin wax, vaseline and lubricating oils.



New Words

Basalt	: Type of dark rock of volcanic origin.
Cathedral	: Main church of a district
Chalk	: Type of soft white rock used for burning to make lime.
Gemstone	: Precious or semiprecious stone before cutting into shape.

Gneiss	: Coarse grained rock of quartz, feldspar and mica.
Granite	: Hard, usually grey, stone used for building.
Igneous rock	: Rock formed when molten magma cools and solidifies.
Limestone	: Type of rock, especially composed of the remains of prehistoric plants and animals.
Magma	: Liquid molten rock in the earth's mantle and crust
Marble	: Type of hard limestone used, when cut and polished for building and sculpture.
Metamorphic rock	: Rock that has been changed by great heat and pressure underground.
Mineral	: A naturally occurring substance formed of plant or animal material; for example, rock and metal.
Ore	: Rock, earth, mineral, etc., from which metal can be obtained easily and economically.
Pebbles	: Small stones made smooth and round by the action of water.
Quartz	: A hard mineral, especially crystallized silica.
Rock-salt	: Common salt as mined in crystal form.
Sandstone	: Rock formed of compressed sand.
Sediment	: Matter that settles to the bottom of a liquid.
Sedimentary rock	: Rock formed when fragments of material settle on the floor of a sea or lake in layers and are cemented together over time.
Shale	: Type of soft rock that splits easily into thin flat pieces.
Slate	: Type of blue grey rock that splits easily into thin flat layers.



RECAP

- ✍ A rock is a natural mass of mineral matter that makes up the earth's crust.
- ✍ Rocks are of three kinds: igneous, sedimentary and metamorphic.
- ✍ Igneous rocks are formed by the cooling of lava on the surface of the earth.
- ✍ Sedimentary rocks are formed by the deposition of sediments on the beds of seas and oceans.
- ✍ The intense heat and pressure inside the earth changes the igneous and sedimentary rocks into metamorphic rocks.
- ✍ All rocks contain many useful minerals.
- ✍ Many useful metals are found in rocks or mixed with loose rock materials. Such mixtures are called ores.
- ✍ Metals are extracted from ores.
- ✍ Coal is formed by the metamorphosis of remains of trees and plants under the earth.
- ✍ Petroleum is a valuable mineral found in the rocks underground.
- ✍ Diamond is the hardest known naturally occurring substance.

Think and Answer

I. Fill in the blanks. Choose the right word/words from the box:

Sandstones	shelly	sedimentary
petroleum	marble	magma

1. _____ Rocks contain skeletons of sea animals.
2. Vaseline is obtained from _____.
3. _____ is used in making statues.
4. The fiery hot substance inside the earth is called _____.
5. Many buildings in Jaipur are built of _____.
6. The _____ limestone is made up of broken sea shells.

II. Name the following

1. Two igneous rocks.
2. Two sedimentary rocks
3. Two metamorphic rocks
4. Three useful minerals contained in granite.
5. Useful substances obtained from petroleum.
6. Metamorphic rocks which are formed from shale and limestone.
7. The hot, liquid rock found under the earth.



III. Classify the following rocks into igneous, sedimentary and metamorphic rocks:

Slate	marble	shale	sandstone	limestone
Granite	Basalt	Gneiss	rocksalt	chalk

IV. Answer the following questions :

1. How are igneous rocks formed?
2. How are sedimentary rocks formed ?
3. How are metamorphic rocks formed ?
4. What is an ore ?
5. How is coal formed ?
6. How was petroleum formed ?
7. State one use each of :

Quartz , granite and marble.

Do and Learn

Make a collection of different rocks.
Try to identify them.

