

CRITICAL UNDERSTANDING OF ICT

# INTERIOR OF THE EARTH

GEOGRAPHY CLASS 7TH

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1/20/2019

## CHAPTER: 1



# INTERIOR OF THE EARTH

**The** inside of the earth can be understood only by indirect evidences like, seismic waves (earthquakes and volcanic eruptions) because no one can reach the interior of the earth. By studying these seismic waves and their movements, we come to know about the interior of the earth.

## Layers of the Earth

**The** interior of the earth is made up of several concentric layers on top of the other, like an onion. The outermost layer is called the crust. It is the layer where we live. Under the crust, is the layer of molten rocks called mantle, beneath the mantle lies the core, which is the hottest part of the earth.

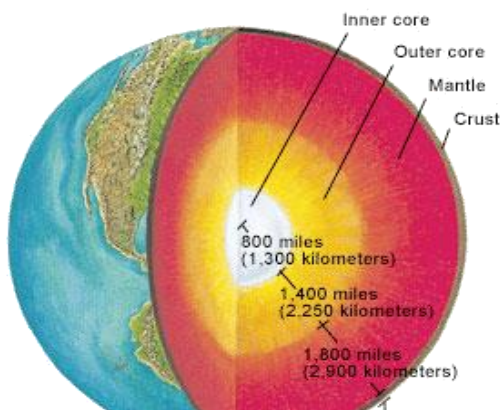


Figure 1 INTERIOR OF THE EARTH

## CRUST

It is the uppermost layer of the earth. Its

average thickness varies from 30 to 50 kilometres and thickness averages more than three times as much as from the oceanic crust to the continental crust. The crust is divided into two layers.

The upper layer of the crust is called the continental crust. It varies in thickness from about 30 km to about 50 km (under mountains). There are two layers of the continental crust the lowest denser layer is made up of sima (silica and magnesium) and the upper less dense layer made up of sial (silica and alumina). The upper layer consists of granitic rocks while the lower layer consists of basaltic rocks.

The oceanic crust is much thinner than the continental crust, with an average thickness of about 5 to 10 km. It has one layer of sima, which consists of basaltic rocks and gabbros.

### KNOWLEDGE KIT

**GEOLOGY IS THE STUDY OF THE STRUCTURE OF THE EARTH.**

## MANTLE

**The** mantle is a very thick layer which lies below the crust. Its average thickness is 2886 km. It is made up of dense and

heavy materials. The mantle is divided into two parts, the upper mantle and the lower mantle. The upper mantle is in solid state and the lower mantle.

### KNOWLEDGE KIT

**THE GREATEST DEPTH REACHED BY MAN IS ABOUT 7 KM, WHILE BORING FOR OIL.**

The upper mantle is in solid state and the lower mantle is in semi molten condition. The temperature in this layer ranges between 870°C (upper mantle) to 4000°C (lower mantle). Silicon and magnesium are the chief elements that make up this layer (sima).

## Core

**The** core is the innermost layer of the earth with radius of about 1220 km. It is made up of nickel and iron and is therefore also called nife (ni- nickel and fe- ferrous or iron). Many experts attribute the magnetic properties of earth to the presence of nickel and iron. The core is also known as the

**KNOWLEDGE KIT**  
**THE RADIUS OF THE EARTH IS 6,371 KM. THE CRUST FORMS ONLY 0.5% OF VOLUME OF THE EARTH.**

barysphere. It is divided into two parts- inner core (which is solid) and

outer core (which is molten). The core has extremely high temperature varying from 3000°C to 6000°C.

## ROCKS AND MINERALS

**Compounds** and elements which are formed naturally and usually found in lithosphere are called minerals. Minerals can be organic or inorganic. Organic minerals are formed from the decomposition of dead animals and plants trapped inside earth. Coal, petroleum and natural gas are organic minerals which are formed in this way. As these minerals are sources

## KNOWLEDGE KIT

**FOSSILS CAN HELP DETERMINE THE AGE AND HISTORY OF ROCKS.**

of energy, they are also known as fossil fuels.

Inorganic minerals can be divided into metallic (iron, gold, aluminium) or non-metallic (silicon, sulphur).

A rock is an aggregate of

minerals. It may contain one or more than one minerals. The term rock not only refers to the harder materials like granite, sandstone and marble but also to softer materials like clay, sand, mud, chalk etc. Rocks do not have a definite chemical composition. Quartz and feldspars are the two most common minerals found in the rocks.

**ACTIVITY** Make a 3D model of the earth's interior. Showing three layers of the Earth.

## TYPES OF ROCKS

On the basis of their formation, rocks can be classified into:

### Igneous Rocks

The word igneous has been taken from a Latin word ignis which means fire. All the igneous rocks have come up after the cooling and solidification of the



Figure 2 IGNEOUS ROCKS

molten material known as magma. By the internal pressure and heat, the rocks inside the earth get melted into liquid form which are pushed further towards the surface where they cool down and get solidified thereby making up the crust.

**KNOWLEDGE KIT**  
**BENEATH THE**  
**SURFACE OF THE**  
**EARTH THE**  
**MOLTEN**  
**MATERIAL IS**  
**CALLED MAGMA**

**Igneous** rocks are also called primary rocks as they were the first rocks to be formed and all other rocks formed from them. They usually occur as large sharpness masses. They are hard and non-porous, which makes them ideal for making buildings, roads etc. They are usually crystalline or glossy in appearance. Metallic ores such as iron, gold and silver ores are often found in igneous rocks.

**The** material forming igneous rocks is hot, sticky and liquid. This material gets solidified either on the surface of the earth or inside the earth. The rocks which are formed due to the



Figure 3 TYPES OF IGNEOUS ROCKS

solidification of lava on the surface of earth are known as extrusive igneous rocks and the rocks which are formed due to the solidification of magma within the earth are known as intrusive igneous rocks and the rocks which are formed due to the solidification of magma within the earth are known as intrusive igneous rocks. Intrusive

igneous rocks are also known as plutonic rocks because they are formed at great depth below the surface of the earth. Some examples of igneous rocks are granite, gabbros, basalt, rhyolite etc.

## Sedimentary Rocks

**The** word sedimentary comes from the latin word sedimentum meaning settle down. Sedimentary rocks are formed from fragments of other rocks. Igneous rocks often break down into smaller particles due to the action of water, wind, animals etc. Such particles are called sediments. Moving agents like rivers, winds and glaciers carry and deposit these sediments under water.

These deposits usually occur in layers. With the passage of time, these layers start hardening and cementing owing to the weight of overlying layers.

Thus rocks formed from the debris of other rocks and living matter are called sedimentary rocks. For example, sandstones, shale, limestone, conglomerate, slate etc.

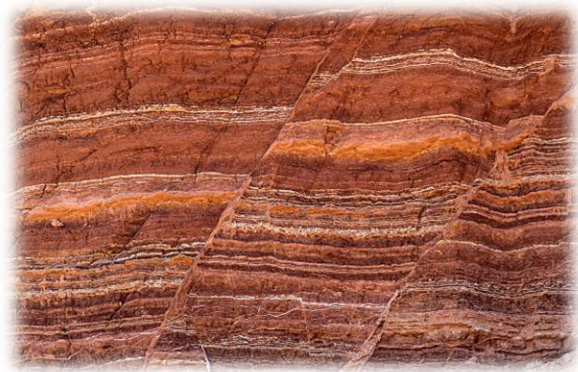


Figure 4 SEDIMENTARY ROCK



Figure 5 TYPES OF SEDIMENTARY ROCKS

**Sedimentary** rocks are economically very important for humans. Many sedimentary rocks have organic sediments which have compacted to form coal or petroleum and natural gas within

the layers. Coal is regraded as a rock, while petroleum or crude oil and natural gas are considered to be mineral fuels. Sedimentary rocks also hold fossils of ancient life forms.



Figure 6 METAMORPHIC ROCK

## Metamorphic Rocks

The term metamorphic is derived from a Greek word metamorphic meaning change of form. Metamorphic rocks are those rocks whose properties and appearance have changed within the earth's

crust due to the high temperature or pressure or both. Metamorphic rocks can be formed either from igneous rocks or from sedimentary rocks.



Figure 7 TYPES OF METAMORPHIC ROCK

**Sometimes**, even previously formed metamorphic rocks are again metamorphosed due to great heat and pressure. Slate and marble are the examples of metamorphic rocks as they are formed due to great heat and pressure exerted on clay and limestone, respectively. Metamorphic rocks are associated with a number of valuable metallic minerals including gold and silver. These rocks are usually hard rocks. They do not break easily. Some examples of metamorphic rocks are slate (made from shale and clay), schist, quartzite and marble.



# ROCK CYCLE

We know igneous rocks can give rise to sedimentary rock and both can change into metamorphic rocks. This natural process of transformation of one rock type into another is called the rock cycle.

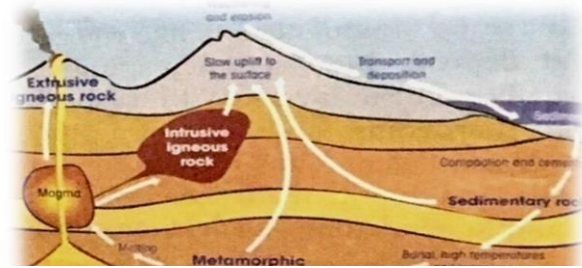


Figure 8 ROCK CYCLE

**Igneous** rocks are primary rocks. The other rocks i.e. sedimentary and metamorphic rocks form from these

primary rocks.

Fragmented igneous rocks when once transported they form sedimentary rocks.

When the metamorphic rocks are destroyed and buried deep beneath the earth's crust, they change into magma and

once again the formation of igneous and sedimentary rocks take place.

## KNOWLEDGE KIT

**WATER PLAYS AN IMPORTANT ROLE IN ROCK CYCLE. IT HELPS BREAK DOWN ROCKS IN SMALLER PIECES BY PROCESS CALLED WEATHERING.**

# USES OF ROCKS

**Rocks** are very useful to us like:

1. Soil is formed when rocks break down into small pieces through

## KNOWLEDGE KIT

**THE STUDY OF THE ROCKS IS CALLED PETROLOGY. PETROLOGY COVERS THE AREA OF MINEROLOGY ALSO.**

physical and chemical processes. These rocks pieces finally turn into very fine particles to form soil and as we know soil is a very important natural resource.

2. Rocks are the store house of minerals e.g. fossil fuels like coal, petroleum and natural gas are found in sedimentary rocks whereas in igneous and metamorphic rocks, we find large reserves of metallic minerals.
3. Rocks are extensively used in construction of roads, houses etc. Limestone is a major raw material for the cement industry.
4. Rocks are a source of precious stones and gems such as diamonds.
5. Ores are widely used in industries to obtain metals and minerals.

## KEY WORDS

**VOLCANO** : An opening in the crust of the earth through which material from the interior of the earth is erupted on to the surface.

**FOSSILS** : The remains of dead animals and plants which have hardened into rocks.

### ANALYSE YOURSELF

We use some products made up of metamorphic rocks. Fill in the blanks showing metamorphic rocks related products and make usage.

#### Metamorphic rocks

1. Slate
2. Limestone
3. Talc

#### Usage

- |                      |
|----------------------|
| <input type="text"/> |
| Building material    |
| Sweat absorbent      |

#### Objects

- |                      |
|----------------------|
| Blackboard           |
| <input type="text"/> |
| <input type="text"/> |

# SELF EVALUATION

## FILL IN THE BLANKS

- a. The \_\_\_\_\_ is the outermost layer of the earth.
- b. \_\_\_\_\_ is an aggregate of a minerals.
- c. \_\_\_\_\_ rocks are formed by cooling of magma.
- d. Rocks that contain fossils are \_\_\_\_\_ .
- e. Igneous rocks are \_\_\_\_\_ rocks.
- f. Sedimentary means \_\_\_\_\_ .
- g. Igneous rocks can give rise to \_\_\_\_\_ rocks.
- h. \_\_\_\_\_ plays an important role in water cyle.

## STATE WHETHER THE FOLLOWING STATEMENTS ARE TRUE OR FALSE:

- a. Layer beneath the crust where molten rocks are found is called crust. \_\_\_\_\_
- b. Oceanic crust is composed of silica and magnesium. \_\_\_\_\_
- c. Oceanic crust is much thinner than the continental crust. \_\_\_\_\_
- d. Igneous rocks are also called primary rocks. \_\_\_\_\_
- e. Sedimentary rocks are economically very important for humans. \_\_\_\_\_
- f. Rocks are naturally existing masses of magma. \_\_\_\_\_
- g. Granite is an example of metamorphic rock. \_\_\_\_\_
- h. Ores are widely used in industries to obtain metal and minerals. \_\_\_\_\_

## **DISTINGUISH BETWEEN THE FOLLOWING:**

- a. Continental crust and oceanic crust
- b. Sial and sigma
- c. Core and mantle
- d. Extrusive rocks and intrusive rocks
- e. Igneous rocks and sedimentary rocks

## **ANSWER THE FOLLOWING QUESTIONS:**

- a. What is the outermost and thinner most layer of the earth?
- b. Give a brief account of the layers of the earth.
- c. What is the difference between upper mantle and lower mantle?
- d. What are minerals? What are their types? Explain them.
- e. What is magma? How does it change into rock.
- f. What are sediments?
- g. How are metamorphic rocks formed?
- h. Why are igneous rocks called primary rocks?
- i. What do you understand by rock cycle?

## **HOTS:**

- a. Why do we use term 'rock cycle' and not 'rock formation'?
- b. If you want to find a diamond, which type of rock will serve your purpose?