

Lithosphere

The solid component of the earth is called lithosphere. It constitutes the hard and rigid vertical layers of the earth. It includes the crust and the uppermost mantle.

Internal structure of the earth:

The earth's interior is generally divided into three layers----the crust, the mantle, the core.

The crust

1. It is the outermost layer and may be of two types, continental crust and oceanic crust.
2. The thickness of the crust varies from 64 to 96 km.
3. The upper crust is composed mainly of granite. The forming rock minerals are Silica and Aluminium. So it is also called SIAL. The specific gravity of this layer is about 2.7.
4. Lower crust is mainly composed of basalt. The main constituent minerals are silica and magnesium. So it is also called SIMA. The specific gravity of this layer is about 3.0.
5. The imaginary line between the upper and lower crust is known as Conrad Discontinuity.
6. Earthquakes generally occur in the upper crust.
7. At the base of the crust there is a substantial change in seismic velocity, this is known as Mohorovicic Discontinuity or Moho.

The mantle

1. This layer is located below the crust and above the core.
2. The thickness of the mantle is about 2880 km.
3. The mantle can be divided into two layers --- asthenosphere and mesosphere.
4. Asthenosphere or the upper mantle is mainly composed of Chromium (Cr), Iron (Fe), Silicon(Si) and Magnesium(Mg) or CHROFESIMA . The specific gravity of the upper mantle varies from 3.0 to 3.5.
5. The lower mantle or mesosphere is mainly composed of Nickel (Ni), Iron(Fe), Silicon(Si) and Magnesium(Mg) or NIFESIMA. The specific gravity of lower mantle varies from 3.5 to 4.5.
6. Lower mantle is more rigid and immobile than upper mantle.

The core

1. It is the innermost layer also known as barysphere.
2. The thickness of this layer is about 3500 km.
3. It is the hottest, heaviest and densest layer of the earth's interior.
4. It is mainly composed of Nickel and Iron. The other components are Sulphur, Silica and Cobalt.
5. The core can be divided into outer core and inner core.
6. The outer core is the only liquid layer of the earth's interior. The thickness of this layer is about 2250km.
7. The inner core contains more solidified compact metallic minerals. The thickness is about 1250km.

8. The specific gravity of the core is 13 and the temperature is between 5000 °C to 5500 °C.
9. The iron and nickel in the core is the most likely source of the earth's magnetic field.
10. The imaginary line between the mantle and the core is known as Gutenberg Discontinuity.

Rocks

A rock is any naturally occurring solid mass or aggregate of minerals which form the earth's solid outer layer. Generally eight elements are most abundant in rocks ----O, Si, Al, Fe, Ca, Na, K and Mg. The minerals which are most commonly found in rocks are quartz, feldspar, mica, calcite, olivine, hematite. According to the mode of origin and chemical composition rocks can be of three types ----- igneous rock, sedimentary rock and metamorphic rock.

Igneous Rock

1. It is the primary rock and make up about 65% to 80% of the earth's crust.
2. It is formed by cooling and solidification of magma or lava.
3. When magma cools and crystalizes slowly within the earth's crust, it forms plutonic igneous rock. Eg. Granite.
4. When magma gushes out on the earth's surface As lava and cools rapidly, it forms volcanic igneous rock. Eg. Basalt.
5. Igneous rocks are unstratified, hard and crystalline in structure.
6. Fossils cannot be found in igneous rocks.
7. Depending on the chemical composition igneous rocks are of four types ----acidic rock ($\text{SiO}_2 > 65\%$), intermediate rock($\text{SiO}_2 \rightarrow 55\%$ to 65%), basic rock($\text{SiO}_2 \rightarrow 45\%$ to 55%) and ultrabasic rock($\text{SiO}_2 < 45\%$).

Sedimentary rock

1. This rock is formed on the earth's surface by the accumulation and concentration of fragments of earlier rocks, minerals and organisms or as chemical precipitates, organic growth in water.
2. The primary rock undergoes weathering and erosion. The eroded materials are transported to the place of deposition by water, wind, ice or glacier as sediments. With progression of time these sediments undergo physical and chemical changes, compressed and hardened to form sedimentary rocks.
3. On the basis of formation sedimentary rocks are categorized as -----
 - a) Mechanically formed ---- Eg. Sandstone(hardened sands), shales(hardened clays)
 - b) Organically formed ---- Eg. Coal(by organic breakdown of vegetation), limestone and chalk(by deposition of remains of shells and skeletons of marine life)
 - c) Chemically formed ----Eg. Rock salt, gypsum (formed by evaporation of chemical sedimentation)
4. These rocks are stratified rocks.
5. They are softer than igneous and metamorphic rocks.
6. These rocks contain fossils.

Metamorphic Rock

1. Metamorphic rocks are formed when, any rock type –igneous, sedimentary or older metamorphic rock undergoes transformation by high temperature and tremendous pressure.
2. They are unstratified, hard and crystalline.
3. They do not contain fossils.
4. Examples: Quartzite (parent rock sandstone)
Gneiss (parent rock granite)
Graphite (parent rock coal)
Marble (parent rock limestone)
Slate (parent rock shale)