

For XAT , CMAT , SNAP , MAT , IIFT Exam

MINERALS AND ROCKS

MINERALS

- The earth is composed of various kinds of elements. These elements are in solid form in the outer layer of the earth and in hot and molten form in the interior.
- About 98 per cent of the total crust of the earth is composed of eight elements like oxygen, silicon, aluminium, iron, calcium, sodium, potassium and magnesium and the rest is constituted by titanium, hydrogen, phosphorous, manganese, sulphur, carbon, nickel and other elements.
- The Major Elements of the Earth's Crust
 - Oxygen 46.60%
 - Silicon 27.72%
 - Aluminium 8.13%
 - Iron 5.00%
 - Calcium 3.63%
 - Sodium 2.83%
 - Potassium 2.59%
 - Magnesium 2.09%
 - Others 1.41%
- The elements in the earth's crust are rarely found exclusively but are usually combined with other elements to make various substances. These substances are recognised as minerals.

Metallic Minerals

- These minerals contain metal content and can be sub-divided into three types:
 - (i) Precious metals: gold, silver, platinum etc.
 - (ii) Ferrous metals: iron and other metals often mixed with iron to form various kinds of steel.
 - (iii) Non-ferrous metals: include metals like copper, lead, zinc, tin, aluminium etc.

Non-Metallic Minerals

- These minerals do not contain metal content. Sulphur, phosphates and nitrates are examples of non-metallic minerals. Cement is a mixture of non-metallic minerals.

SOME MAJOR MINERALS AND THEIR CHARACTERISTICS

Feldspar

- Silicon and oxygen are common elements in all types of feldspar and sodium, potassium, calcium, aluminium etc. are found in specific feldspar variety. Half of the earth's crust is composed of feldspar.
- It has light cream to salmon pink colour. It is used in ceramics and glass making.

Quartz

- It is one of the most important components of sand and granite. It consists of silica. It is a hard mineral virtually insoluble in water.
- It is white or colourless and used in radio and radar. It is one of the most important components of granite.

Pyroxene

- Pyroxene consists of calcium, aluminum, magnesium, iron and silica. Pyroxene forms 10 per cent of the earth's crust.
- It is commonly found in meteorites. It is in green or black colour.

Amphibole

- Aluminium, calcium, silica, iron, magnesium are the major elements of amphiboles. They form 7 per cent of the earth's crust.
- It is in green or black colour and is used in asbestos industry. Hornblende is another form of amphiboles.

Mica

- It comprises of potassium, aluminium, magnesium, iron, silica etc. It forms 4 per cent of the earth's crust. It is commonly found in igneous and metamorphic rocks. It is used in electrical instruments.

Olivine

- Magnesium, iron and silica are major elements of olivine. It is used in jewellery. It is usually a greenish crystal, often found in basaltic rocks.

ROCKS

- The earth's crust (Lithosphere) is composed of rocks. An aggregate of minerals on the Earth's crust is called 'rock'. It may be hard and compact like 'granite' or soft as 'clay' or loose as 'sand'. Gabbro is black and quartzite can be milky white.
- Rocks do not have definite composition of mineral constituents. Feldspar and quartz are the most common minerals found in rocks
- The scientific study of rocks is called **petrology**
- Based on formation, rocks are classified as
 1. Igneous-- solidified from magma and lava
 2. Sedimentary-- the result of deposition of fragments of rocks by exogenous processes
 3. Metamorphic-- formed out of existing rocks undergoing recrystallisation.

IGNEOUS ROCKS

- The igneous rocks are formed by the solidification of molten magma. These rocks are also called as the 'Primary Rocks' or 'Parent Rocks' as all other rocks are formed from these rocks.
- They do not contain fossils
- They are associated with the volcanic activities
- These rocks are useful for construction work
- Granite, gabbro, pegmatite, basalt, volcanic breccia and tuff are some of the examples of igneous rocks.

SEDIMENTARY ROCKS

- The word 'sedimentary' is derived from the Latin word sedimentum, which means settling.
- Rocks (igneous, sedimentary and metamorphic) of the earth's surface are exposed to denudational agents, and are broken up into various sizes of fragments. Such fragments are transported by different exogenous agencies and deposited. These deposits through compaction turn into rocks. This process is called lithification. In many

sedimentary rocks, the layers of deposits retain their characteristics even after lithification. Hence, we see a number of layers of varying thickness in sedimentary rocks like sandstone, shale etc.

- Depending upon the mode of formation, sedimentary rocks are classified into three major groups:
 - Mechanically formed — sandstone, conglomerate, limestone, shale, loess etc. are examples;
 - Organically formed — geyselite, chalk, limestone, coal etc. are some examples;
 - Chemically formed — chert, limestone, halite, potash etc. are some examples.

METAMORPHIC ROCKS

- These are changed form of igneous and sedimentary rocks

Sedimentary rocks	Metamorphic rocks
Lime stone	Marble
Sandstone	Quartzite
Shale/clay	Slate , Schist
Coal	Diamond

- When Igneous or sedimentary rocks are subjected to extreme heat and pressure, they undergo a complete change in their form and character
- Rocks are useful for making
 1. Cement
 2. Writing chalk
 3. Fire
 4. Building materials,
 5. Bath scrub,
 6. Kerb stone
 7. Ornament,
 8. Roofing materials ,
 9. Decorative materials,
 10. Rocks are valuable source of minerals such as gold, diamond, sapphire etc.