UNIT – IV

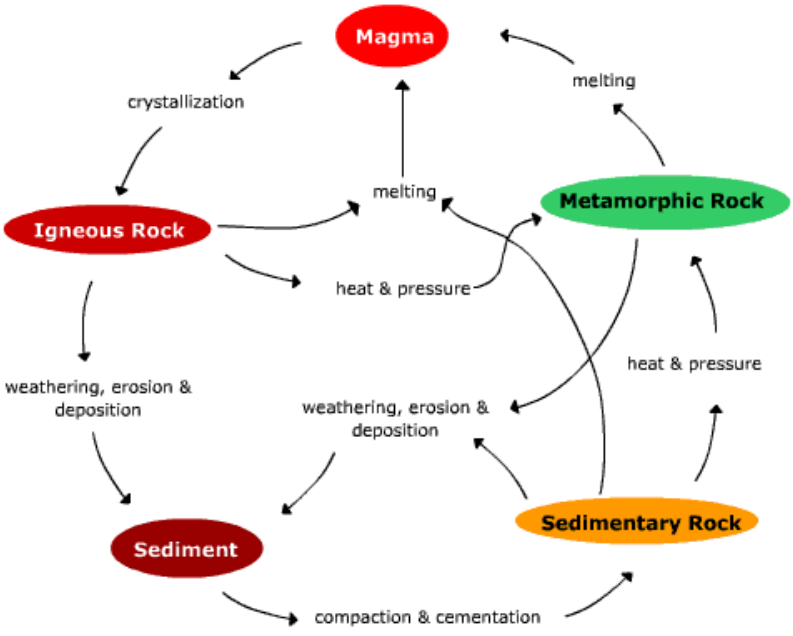
Processes that shape the Earth

Chapter 7: *Geosphere*

MINERALS AND ROCKS

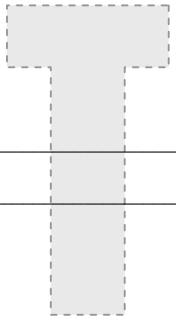
These are non-living solids which occur naturally and have a fixed chemical composition. Minerals are the building blocks of rocks and are made up of atoms and molecules. The minerals have a regular, repeating pattern of atoms which results in the formation of crystal lattice. Minerals can be differentiated on the bases of their physical properties such as color, luster, streak, hardness, etc. The most important property which is used to identify the minerals is the hardness which is measured by using the Mohs' scale. While diamond is the hardest mineral known, talc is considered to be the softest one.

Minerals are the building blocks of rocks which can be classified as igneous, sedimentary and metamorphic. These three types of rocks continuously change from one form to another in a process called rock cycle which is shown below.



Cooling and solidification of magma results in the formation of igneous rocks. These types of rocks can be formed over as well as below the earth's surface. Common examples of igneous rocks are granite, basalt. Sedimentary rocks are formed above the surface of the earth due to extreme pressure which causes the cementation of sediments. Common examples of this type of rocks are limestone and shale. Metamorphic

rocks are formed as a result of chemical change caused by great heat and pressure on any type of rocks. These types of rocks are formed inside the earth's surface. Common example of this type of process is limestone changing into marble. If the heat and pressure is too great the metamorphic rock will melt to form magma and the process continues.



READING CHECK:

How will you define minerals?

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READING CHECK:

What are the three main types of rocks?

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READING CHECK:

How sedimentary rocks are formed?

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READING CHECK:

How igneous rocks are formed?

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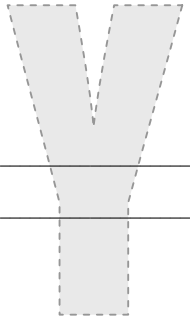

READING CHECK:

How metamorphic rocks are formed?

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READING CHECK:

What is a rock cycle?

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MECHANICAL WEATHERING AND CHEMICAL WEATHERING

The breaking of rocks into smaller pieces due to the action of wind, water, roots and animal is called weathering

Mechanical weathering

In this type of weathering, rocks are broken down without any change in their chemical composition and there are several factors responsible for their mechanical weathering. These include water, wind, tree and plant roots. Water can freeze in the cracks present in the rocks and cause the breaking of rocks. Plant roots can grow and can cause the breaking of rocks in the similar manner. Wind can also cause the wearing of rocks

Chemical weathering

In this type of weathering the chemical composition of the rock changes. The minerals present in the rock reacts with the air, water, salt and acid to form new substances. This results in the weakening of rocks.

After the weathering of rocks small rock particles produced may be carried to new location by water, wind or gravity in a process called erosion. Erosion results in the formation of new surface features such as deltas, river valleys, mudslides, sinkholes, etc.

READING CHECK:

What are the factors responsible for mechanical weathering?

READING CHECK:

How water causes mechanical weathering of rocks?

READING CHECK:

What is the effect on the chemical composition of the rocks during mechanical and chemical weathering?

READING CHECK:

In which type of weathering a new substance is formed?

READING CHECK:

How would you define erosion?

LIFE-CYCLES AND INTERACTION OF LIVING THINGS

Every living thing has a unique life-cycle depending on the type of the species. The life-cycle of an organism includes its birth, growth, attempt of reproduction, and eventually death. The cycle may vary from few hours to thousand of years.

A group of living things having similar features is known as species. Death of an entire species is known as the extinction of that class of species. Extinction is a natural process. New species are formed when environmental changes take place. The living organisms require energy for growth. That energy is obtained from food. Plants use nutrients in air and soil as well as sunlight to form energy through a process known as photosynthesis. Animals use this stored energy in the plants as their food. Animals also obtain their energy as food from the other animals. Death of something results in its decomposition which results in return of the nutrients to the soil. Then it acts as a source of life for other organisms to grow.

READING CHECK:

What steps are involved in the life-cycle of an organism?

READING CHECK:

What is the length of the life-cycles of different types of organisms?

READING CHECK:

How would you define species?

READING CHECK:

How do plants obtain their energy for growth?

READING CHECK:

How do animals obtain their energy for growth?

LANDFORMS

The natural shape of the land or feature is known as landform.

A plain is a large, flat landform with little relief. Planes do not have slopes. Great plain is the very large plain in the middle of the United States.

Mountains are the landforms with high elevation and high relief. A mountain is a type of landform which is higher than the surrounding land. Mountains usually occur in groups called mountain range.

All types of landforms are interconnected through plate tectonics. The outer layer of the earth is divided into giant slabs called plates. These plates float on the melted layer of mental. The motion of the layers on the liquid layer is responsible for the formation of different types of features on the earth's surface. Different types of features are formed at the boundary where the plates meet due to convergent, divergent and sliding movement of the plates.

Divergent movement of plates results in the formation of the new crust. Features such as deep crack rift, volcano and new sea floor are formed as a result of this type movement of the plates. When two plates collide

with each other, one is pushed under the other. The plate which is pushed under melts to form magma which comes out of the surface. Cooling and hardening of magma results in the formation of the chain of mountains and volcanoes. When two continental plates collide, the folding of plates takes place which results into the formation of the mountains. The cracks are formed when plates slide past each other. As the plates are connected to each other, the processes occurring at one place can affect the location far away.

READING CHECK:

What do you mean by landform?

READING CHECK:

Which types of landforms have small relief and low elevation?

READIND CHECK:

Which types of landforms have high relief and high elevation?

READING CHECK:

How different types of landforms are interconnected?

READING CHECK:

Which layer of the earth is broken down into plates?

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READING CHECK:

Why movement of the earth's plates takes place?

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READING CHECK:

What are the different types of movements of the earth's plates?

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READING CHECK:

Which surface features are formed when two ocean plates push each other?

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Chapter 8: *The Actions of Living Things*

The Interaction of Earth's Process

All the things that are present in the universe are interrelated. Gravity draws all masses towards each other. The movement of the heat through the atmosphere results in change in the weather across the globe position of land and oceans changes due to the movement of plates. These events are united by the fundamental properties of time, distance and mass as given below

* Many substances have mass and contain a fixed amount of matter
* All objects occupy a fixed amount of space
* Distance separates objects and defines their position
* Events occur in some period of time.

In different situation different scales can be used to measure length, mass, and time. An Angstrom is used for measuring very small distances such as distances between atoms. It is equal to 10-10 meters. On the other

hand for measuring very large distances such as distances between the stars, light year is used. A light year is defined as the distance that light can travel in one year. Similarly mass can also span an enormous range. An electron has virtually no mass while a large black hole might have the mass of a 100 billion stars

Similarly events can occur in an instant or over long period of times. It takes only a fraction of second for lightning to strike. On the other hand, universe has been around for about 15 billion years and there has been life on earth for about 4 billion years

READIND CHECK:

How will you define a light year?

READIND CHECK:

Which scale of length is used for measuring very vast distances?

READIND CHECK:

How will you explain that mass can also span an enormous range?

READIND CHECK:

How will you explain that event occur in an instant or over long period of time?

RESHAPING THE LANDSCAPE

There are many different types of features present on the earth such as mountains, valleys, oceans and many of other landforms. Reshaping of landscapes takes place due to many factors such as mechanical and chemical weathering. Living things such as plants, animals and bacteria can also affect, alter and reshape the landscape. The medium and the nutrient for the plant growth are provided by the soil. Soil is a mixture containing small particle of rock, mineral, decayed plant material and tiny organisms. The burrowing animals aerate and turn over the soil.

This makes the soil lighter, more porous and easier to plant. The plants roots helps in anchoring the soil which decreases soil erosion. The plants also cause the weathering of rocks. The plant roots cause the widening of cracks and finally cause breaking of rocks.

READING CHECK:

What are the different types of features present on the earth?

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READING CHECK:

What are the factors that cause the reshaping of landscapes?

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READING CHECK:

What is the importance of soil in the plant growth?

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READING CHECK:

What are the constituents of soil?

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READING CHECK:

What is the role of plants in weathering of rocks and avoiding the erosion of the soil?

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How Humans Change the Environment

Pollution is the introduction of the contaminants into the air, water and earth's land that affect the health, life, and natural process. Most of the pollution is due to human activities. Some of the serious environmental problems have been discussed below:

Greenhouse effect: It happens due to the burning of the fossil fuels and decreasing of forests. It results in the increase in the amount of the heat–trapping atmospheric gases. It results in the change in the climate, drought and flooding.

Acid rain: The rain becomes acidic due to the burning of the fossil fuels. It can erode statues and buildings, destroy forests, poison lakes etc.

Ozone depletion: It occurs due to the use of certain chemicals (like CFCs).It decreases the ultraviolet rays blocking capacity of ozone. It results in cancers and mutation in all life forms.

Air pollution: It happens due to the burning of the fossil fuels, wood, releasing chemicals into the air. It results in the increase in the disease.

Water pollution: Waste, chemicals etc contaminates rivers, lakes and oceans. It results in the treat to the species that live in the water, less clean water for drinking, farming etc.

Soil degradation/depletion: It happens due to soil erosion, overuse, use of the pesticides. It affect the agriculture and the organisms that live in the soil.

Habitat destruction: Its causes are lakes poisoning, destroying forests, and other areas for wood , homes , etc.. It upsets the balance of nature.

Pollution can be decreased by taking appropriate steps. Some of the strategies that can help protect the environment are discussed below:

Reduce, reuse, and recycle waste: It decreases the amount of the waste to be dumped, burned or buried. It reduces the demand of the raw material for many processes.

Fuel–efficient cars: It decreases the amount of the chemicals into the air, reduce demand for drilling for oil.

Conserve electricity and water: It decreases the burning of fossil fuel, protects the water sources

Grow and buy organic food: Reduces the demand of the pesticides, fertilizers.

Public transportation/drive less: Lessens air pollution and protects natural resources.

READING CHECK:

How will you define pollution?

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READING CHECK:

What are the causes of the Greenhouse effect?

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READING CHECK:

What are the possible results of acid rain?

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READING CHECK:

How the use of chemicals like CFCs does affect the environment?

READING CHECK:

What are the causes and the possible results of the Soil degradation?

READING CHECK:

What are the causes and the possible results of the Habitat Destruction?

READING CHECK:

What is the benefit of using Fuel–efficient cars?

READING CHECK:

How the demands for fertilizers and pesticides can be reduced?

READING CHECK:

What are the benefits of using public transport?

READING CHECK:

What is the benefit of recycling the waste?