

9. Weathering and Denudation

EXERCISE

A. Answer the following questions :

1. Define weathering. How does it occur?

- Ans.**
- Weathering involves disintegration and decomposition of rocks where they exist. Therefore, it is a static process.
 - It occurs by the action of heat and cold, wind , rainwater , biotic factors and frost.

2. Name the three types of weathering.

Ans. The three types of weathering are:

- Physical or mechanical weathering
- Chemical weathering in which the main agent is rainwater.
- Biotic or biological weathering.

3. What is soil and how is it formed?

Ans. Soil is the thin layer of material covering the earth's surface and is formed from the weathering of rocks. It is made up mainly of mineral particles, organic materials, air, water and living organisms, all of which interact slowly yet constantly.

4. What do you understand by denudation?

Ans. Denudation refers to all processes that cause degradation of landscape, weathering mass movement, erosion and transport.

5. How does frost cause weathering of rocks?

Ans. Frost is the most common agent of weathering in the temperate regions:

- When water enters the rocks and turns into ice, the volume increases.
- During the day the ice thaws and the water enters deep into rocks.
- When temperature drops during the night, the water again freezes, widening the crack.
- This repeated freezing and thawing results in breaking up of rocks.

6. In what ways does atmosphere assist in weathering?

Ans. The ways in which atmosphere assist in weathering are:

- Carbon dioxide is an atmospheric constituent that plays several vital roles in the environment.
- It is a greenhouse gas that traps infrared radiation heat in the atmosphere. It plays a crucial role in the weathering of rocks. e.g., Rainwater, when mixed with carbon dioxide in the atmosphere forms a weak solution of carbonic acid.
- It acts on rocks containing limestone and chalk.
- Weathering of limestone regions in this way gives rise to various landforms like stalactites and stalagmites in the limestone region.

7. What is meant by chemical weathering?

Ans. The decomposition of rocks in which the main agent is rainwater is called Chemical weathering.

- It involves the breaking down of rocks by altering or dissolving the rock minerals due to chemical action of changes.

8. How does biological weathering take place?

Ans. Biological weathering takes place by the biotic factors like plants, animals and human .

9. What do you understand by mechanical weathering? How does it take place?

Ans. Mechanical weathering is the breakdown of rock into smaller fragments by physical processes such as frost wedging.

- It is responsible for the disintegration of rocks by the elements of weather such as heat, frost, wind, plants, man and animals.
- The factors responsible for the mechanical weathering are:

The extremes of temperature, exfoliation, nature of rocks, structure of rocks, frost, wind and slope of the land.

10. How does composition of rock affect mechanical weathering?

Ans. Nature of rocks refers to the composition of rocks:

- Some rocks may be hard and some soft. Some may be soluble and some insoluble.
- Hence, the mechanical weathering takes place in the softer or soluble rocks more easily than in the hard and insoluble rocks.
- In case of sandy soil of desert, it is picked up by wind more easily while clay or loam cannot be lifted by air easily.

11. Name the factors responsible for chemical weathering.

Ans. The process of chemical weathering is governed by the following factors:

- (i) **Oxidation:** When oxygen in the air and water reacts with minerals in rocks, oxidation takes place.
- (ii) **Hydration:** The chemical reaction of water with minerals, changes the proportion and composition of rocks and minerals.
- (iii) **Carbonation:** Carbonation is the reaction of carbonic acid on minerals.
- (iv) **Solution:** When rainwater reacts with the minerals present in rocks it dissolves them. When it seeps below the ground through joints, gaps and crevices, it further dissolves the soluble minerals by forming a solution and separates the insoluble minerals, causing decomposition of rocks.

12. What is carbonation? Give two examples of the landforms formed by carbonation?

Ans. Carbonation is the reaction of carbonic acid on minerals.

For example, Rainwater, when mixed with carbon dioxide in the atmosphere forms a weak solution of carbonic acid

- It acts on rocks containing limestone and chalk.
- Weathering of limestone regions in this way gives rise to various landforms like stalactites and stalagmites in the limestone region.

13. How does chemical weathering take place?

Ans. Chemical weathering takes place due to the decomposition of rocks.

- It involves the breaking down of rocks by altering or dissolving the rock minerals due to chemical action or changes.
- The gradual decomposition of the rocks takes place due to exposure to air and water.

For example, water containing oxygen from the air may change iron in the rocks to iron oxide or iron compounds.

14. What is mass wasting? How does it occur?

Ans. Mass wasting is also known as slope movement or mass movement.

- It is the geomorphic process by which soil, sand, regolith, and rock move downslope typically as a mass, largely under the force of gravity, but frequently affected by water and water content as in submarine environments and mudflows.

B. Define the following terms:

1. Oxidation

Ans. Oxidation: When oxygen in the air and water reacts with minerals in the rock, oxidation takes place.

2. Solution

Ans. Solution: When rainwater reacts with the minerals present in rocks it dissolves them. When it seeps below the ground through joints, gaps and crevices, it further dissolves the soluble minerals by forming a solution and separates the insoluble minerals, causing decomposition of rocks.

3. Exfoliation

Ans. Exfoliation: The changes in the temperature during summer and winter and in case of arid region, during day and night, cause expansion and contraction in the rock surfaces.

This causes the rocks to break up or peel off. This process is called exfoliation.

4. Weathering

Ans. Weathering: Weathering involves disintegration and decomposition of rocks where they exist. Therefore, it is a static process.

It occurs by the action of heat and cold, wind, rainwater, biotic factors and frost.

5. Denudation

Ans. Denudation: A general term that refers to all processes that cause degradation of landscape, weathering mass movement, erosion and transport.

C. Distinguish between the following pairs :

1. Soil creep movement and Soil flow

Soil Creep	Soil Flow
Soil creep is slow movement of soil along the slope. Slope is very gentle and movement is very slow. This makes terrace like features.	Soil flow is faster movement of material along moderate or steep slope. Soil flow fast and landslide very fast movement.
This happens due to daily expansion and contraction of soil particles.	This mass movement happens in presence of water. This happens due to saturation of soil over an impermeable layer of soil.
Soil creep is continuous.	Soil flow and landslides are seasonal and not regular.
Soil creep is extremely slow movement.	Soil flow fast and landslide very fast movement.
Soil Creep is purely function of gravity.	Soil flow and landslides over high-gradient slope.

2. Chemical and Mechanical Weathering

Chemical	Mechanical
Chemical weathering takes place due to the decomposition of rocks.	Mechanical weathering is the breakdown of rock into smaller fragments by physical processes such as frost wedging.
The factors responsible for the chemical weathering are oxidation, hydration, carbonation and solution.	The factors responsible for the mechanical weathering are: The extremes of temperature, exfoliation, nature of rocks, structure of rocks, frost, wind and slope of the land.

3. Weathering and Denudation

Weathering	Denudation
Weathering involves disintegration and decomposition of rocks where they exist. Therefore, it is a static process.	Denudation refers to all processes that cause degradation of landscape, weathering mass movement, erosion and transport.
Weathering is one of the several processes of denudation.	Denudation itself includes several processes like weathering, erosion and mass wasting.
For example, biological weathering.	For example, the Aravali mountains have been denuded due to the action of the winds.

