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Ch - 9
Weathering

Q. What is weathering ?

Ans Weathering is the process of breaking down of rocks but not its removal. It is described as disintegration or decomposition of a rock, in size by natural agents at or near the surface of the earth.

Q. Differentiate between Physical and Chemical weathering.

Ans

Physical Weathering (Mechanical)	Chemical Weathering
1. Disintegration of rocks take place without any change in chemical constituents of rocks.	1. Decomposition of rocks take place with changes in the chemical constituents of rocks.
2. It is more rapid in desert climates.	2. It occurs in moist and cold climate.
3. Its agents are temperature and moisture.	3. Its agents are water, oxygen, carbon and various organic acids

Q. What is known as exfoliation ? Name the processes involved in it.

ans As most rocks are not good conductors of heat the outer layer is heated and expands more than the inner layers. This results in peeling-off of the outer layer known as exfoliation. The two processes involved are expansion & contraction.

Q. Name the four process involved in chemical weathering.

ans The four processes involved in chemical weathering are -

1) Oxidation
2) Carbonation
3) Hydration
4) Solution

Q. What is known as oxidation ? What effect does it have on the colour of rocks ?

ans Oxidation means reaction of minerals in rocks to atmospheric oxygen. The rainwater also contains atmospheric oxygen. On coming in contact with iron compounds in rocks, the iron starts rusting or crumbling. The colour of rock also changes to red, yellow or brown.

Q. Briefly describe biological weathering.

ans It is also known as organic weathering. Its main agents are animals, insects,

plants and man. In all the cases, however, both physical disintegration and / or chemical decomposition are involved. This is because all biological matter is made up of oxygen and water, the two substances that set off reaction of minerals in rocks.

Q. Describe chief characteristics of weathering.

ans Chief Characteristics of weathering -

1. It involves disintegration or decay of solid rocks.
2. It depends on climatic elements and on the characteristics of rocks. For ex, the rock's chemical composition, hardness, texture and its permeability determines the weathering pattern.
3. Weathering affects the surface of the earth.
4. Weathering causes formation of soil.
5. Weathering involves not one but several processes to cause disintegration of rocks.
6. Weathering changes hard massive rocks into finer materials.
7. It prepares rock materials for transportation by agents of gradation.

Q. Describe chemical weathering mentioning the process involved in it.

ans The main four processes of chemical weathering are - oxidation, carbonation, hydration, and solution

1. Oxidation - already done

2. Carbonation - Many mineral constituents of rocks such as carbon dioxide while coming in contact with water produce acidic effect on rocks. This action dissolves most calcarous rocks such as gypsum, marble and limestone.

3. Hydration - In this process, expansion of minerals occurs on coming into contact with rainwater. These minerals become heavy and start disintegrating. Ex- Rocks like feldspar are converted into kaolin

4. Solution - It is the process in which minerals in the rocks dissolve in water. All rocks are subjected to solution to some extent. For ex, rainwater causes chemical disintegration of rock-salt and gypsum.

Q. Describe the chief characteristics of weathering in different climates.

ans i) In Equatorial climates, humidity and temperature are constantly high. Weathering specially chemical weathering is more active in these regions.

ii) In Tropical climates, there is a marked dry season and wet season. Differences in

heating leads to consistently high rate of evaporation. During wet season, precipitation of oxides of iron and aluminium takes place from the rocks. This promotes formation of laterite soils. Chemical weathering is more prominent.

iii) In dry climates or deserts, mechanical weathering is most dominant due to high diurnal range of temperature and sharp temperature changes.

iv) In Mid-latitudes or temperate climates, the most powerful agent of weathering is the frost action. In limestone areas, 'solution' or chemical weathering operates on a large scale.

v) In polar climates, physical weathering due to frost action is more prevalent. Chemical and biological weathering in these areas is negligible.

Q. What is biological weathering in? State the main agents of biological weathering.

Ans Already done

The main agents of biological weathering -

i) Humans - Man is the most active agent of both physical and chemical weathering of rocks for ex - mining, excavations, construction

of rocks, buildings, etc cause physical disintegration of rocks. Agriculture, dumping of chemicals and wastes underground promote both physical and chemical weathering.

ii) Plants - Roots of large trees reach deep into rocks and cause physical disintegration due to pressure. Most of vegetation, however, prevents disintegration of rocks because it binds the surface layer and does not allow exposure of rocks beneath to the elements of weathering.

iii) Animals and insects - Animals like rabbits, worms, moles and insects bring large quantities of fine material to the surface. Burrowing animals help to loosen the surface materials, around the rocks facilitating their physical disintegration. Upon death, the decaying animals also provide many chemicals and acids for rock disintegration.

Q. Describe Physical or Mechanical weathering.

ans Mechanical weathering is also known as Physical weathering since it involves rock disintegration without any change in the chemical constituents of the rock.
Weathering due to changes in temperature is more rapid in hot deserts. It is because

temperature changes are sharpest in a desert.

i) Block disintegration - The sudden rise and fall of temperature causes expansion and contraction of rocks. The repeated action causes their break down due to vertical and horizontal cracks the blocks of rocks gets disintegrated from the parent rock.

ii) Granular disintegration - Since rocks are made up of different minerals, weathering may also reduce to pieces and fragments. Their expansion and contraction will not be seen due to which tension is built up within minerals and rocks are reduced to pieces.

iii) Frost action - In cold places and at high altitudes. The cracks and joints of rocks are filled with water during day time and at night, the water freezes leading to rupture of rocks on account of repeated actions of melting and freezing. This is called frost action.

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Very good