(*iv*) *Repetiti discontinuity.* At 950 km depth. It marks the lower limit of the very rapid rise in the velocity of seismic vibrations.

(*v*) *Gravity-break.* At 1200 km depth, gravity attains its minimum value *i.e.*, 974 cm/sec^2, thereafter it rises upto 1068 cm/sec^2 at the core-boundary.

3. **The core.** It is separated from the mantle by the Guttenberg Weichert Discontinuity and extends up to the centre of the earth. It consists of three parts :

(*i*) Outer-core, (*ii*) Middle-core, and (*iii*) Inner-core.

(*i*) *Outer core.* It extends from 2900 to 4982 kms. It is considered to be in a state of homogeneous fluid and it does not transmit S-Waves.

(*ii*) *Middle core.* It is a transition layer, extends from 4982 kms to 5121 kms. The material is in a fluid to semi-fluid state.

(*iii*) *Inner core.* It is believed to contain metallic nickel and iron and is called 'nife'. It is probably solid with a density of about 18. Its thickness is 1250 kms.

Other Important Facts

1. The central-temperature is estimated to be 6000°C.
2. The central-pressure is 392×10^8 bars in C.G.S unit.
3. Density at the centre is 18 gm/cm^3.
4. Lithosphere constitutes the upper horizon of the crust only up to a depth of about 16 km.
5. Asthenosphere is the layer beneath the lithosphere which virtually has no strength to resist deformation.

The intense heat of forest and bush fires is known to cause rapid flaking and scaling of exposed rock-surfaces.

2. Chemical processes of weathering. It is also known as mineral alteration, consists of a number of chemical reactions, all these reactions change the original silicate minerals of igneous rock, *the primary minerals*, into new compounds, the *secondary minerals*, that are stable in the surface environment. Besides, sedimentary and metamorphic rocks are also substantially affected by the chemical processes of weathering. Chemical weathering is more important than mechanical weathering in almost all the climatic regions.

The atmosphere contains a number of constituents that can react with minerals. Most important of these are water, carbon-dioxide, and oxygen. The effectiveness of these chemical constituents depends on the composition of the rocks and size of the particles that make them up. For example, Quartz is a very stable substance, so rocks composed primarily of quartz decompose very slowly ; whereas the ferromagnesian minerals are highly susceptible to chemical weathering.

Three processes are notably responsible for chemical weathering :

(*a*) Oxidation.

(*b*) Hydration.

(*c*) Carbonation.

(*a*) **Oxidation.** The presence of dissolved oxygen in water in contact with mineral surfaces leads to oxidation ; which is the chemical union of oxygen atoms with atoms of other metallic elements. Oxygen has a particular affinity for iron compounds and these are among the most commonly oxidised materials.

(*b*) **Hydration.** The chemical union of water with a mineral is called hydration. It is sometimes confused with 'hydrolysis'. the reaction between water and a compound. The process of hydration is particularly effective on some aluminium bearing minerals, such as feldspar.

(*c*) **Carbonation.** Carbon-dioxide is a gas and is a common constituent of the earth's atmosphere. Rain water in course of its passage through the atmosphere, dissolves some of the carbon-dioxide present in the air. It thus turns into a weak acid called carbonic acid, H_2CO_3, and is the most common solvent acting on the crust. The effect of this process is well noticed in the limestone or chalk areas in the humid regions of the world.

Besides the above, another process known as "*Solution*" is quite significant in bringing about the chemical weathering of rocks. In this case, some of the minerals get dissolved by water and thus removed in solution, for example gypsum, halite etc.

result that the eruptions are quiet and the lava can travel long distances to spread out in thin layers.

Besides the above, a number of other types of volcanoes have been identified according to their degree of explosive activity and nature of eruption. They are as follows :

(*i*) *Hawaiian type.* Silent effusion of lava without any explosive activity.

(*ii*) *Strombolian type.* Periodic eruption, with a little explosive activity.

(*iii*) *Vulcanian type.* Eruption takes place at longer intervals and the viscous lava quickly solidifies and gives rise to explosions of volcanic ash.

(*iv*) *Vesuvian type.* Highly explosive volcanic activity and eruption occurs after a long interval (measured in tens of years).

(*v*) *Plinian type.* The most violent type of vesuvian eruption is sometimes described as plinian. Here huge quantities of fragmental products are given out with little or no discharge of lava.

(*vi*) *Pelean type.* This is the most violent type of all the eruptions. They are characterised by eruption of '*nuées ardentes*'.

Volcanic topography. It includes both positive as well as negative relief features. The high or elevated relief features comprising of hills, mountains, cones, plateaus or upland plains are some of the examples of positive relief feature, while the low lying relief features like craters, calderas, tectonic depression etc. represent the negative relief features.

(*a*) **Positive-relief features.** These features are formed due to both quiet as well as explosive volcanic activity, and some of which are as follows :

(*i*) *Hornitos.* These are very small lava flows.

(*ii*) *Driblet cones.* The most acid lavas often give rise to quite small conelets and are known as driblet cones.

(*iii*) *Cinder cone.* These are volcanoes of central type of eruption, steep-sided with uniform slopes of 30° to 40°.

(*iv*) *Lava cone.* These are built up of lava flows, due to heaping of lava during quiet type of eruption. It is also known as lava or 'plug-dome'.

(*v*) *Composite cone.* These are made up alternatively of pyroclastic material and lava. Due to rude stratification, they are also known as 'Strato-volcanoes'.

(*vi*) *Shield-volcanoes.* These are made up of lava alone and due to quiet type of eruption, whereby piling up of flow after flow of fluid lava, a rounded dome like mass is produced.

2. Other volcanic areas include the scattered areas in the Pacific, particularly the Hawaiian Islands, a belt that includes Arabia, Madagascar and the rift valleys of Africa, the Mediterranean belt, the volcanoes of West-Indies and those of Iceland.

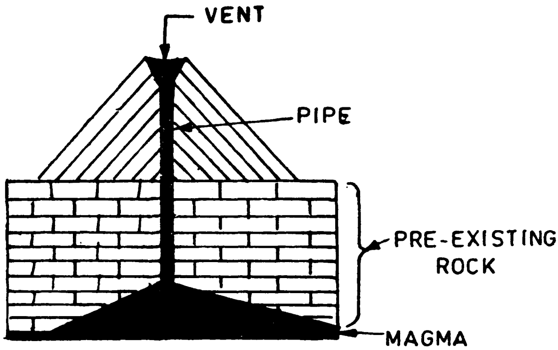

Fig 7·1. Cinder cone.

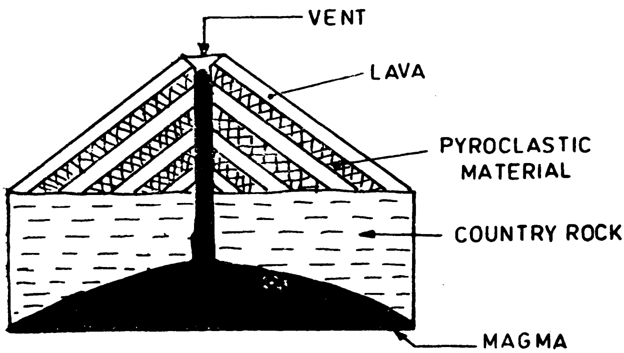

Fig. 7·2. Strato volcano.

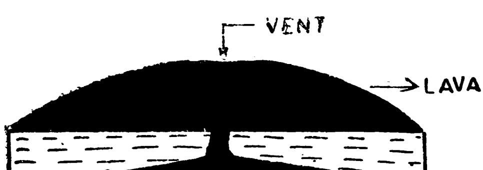

Fig. 7·3. Shield-volcano.