

## Volcanic Landforms

Heated materials consisting of water vapours, gases, fluids, rock fragments, etc. are erupted from the highly heated interior of the earth to the surface. The vent of eruption is called volcano. Mantle is the layer of the earth below the solid crust. The density of mantle is greater than that of crust. It also contains a zone called Asthenosphere. Magma is the material in the upper mantle portion and lava is when it flows towards the crust.

### Volcanism

It is different and all types of processes through which the magma rises to the surface of the earth to solidify into crystalline, non-crystalline or other types of rocks. The mechanisms consist of two processes, one inside the earth, in the crustal surface i.e. endogenic process and the other is the exogenic process. The endogenic mechanism involves the creation of the magma and their expansion and upward ascent and their intrusion and cooling and solidification in various forms. The exogenic process involves when magma erupts as lava creating various landforms on the earth's surface.

The process occurs in various steps as:

1. Temperature increases gradually with increasing depth of the earth's surface.
2. Due to the reduction in pressure of the overlying material, the melting point gets lowered. This leads to the formation of magma.
3. Water, through percolation, reaches underground. It transforms into vapour and gases. The vast volume of vapours and gases forces magma to ascent, which leads to the volcanic eruption.

### Volcanic landforms

There can be two types of volcanic landforms depending upon whether magma got solidified inside, called intrusive or whether lava erupts and volcanic material got accumulated called as extrusive landforms.

## Extrusive landforms

The characteristics of these landforms depend upon the type of lavas. Lavas can be Acidic or Basic.

**Basic Lavas** are highly fluid and have a very high temperature. Due to richness of iron and magnesium, and hence are dark coloured like basalt. They are not explosive, flows quietly and hence to a larger distance. The reach is large in the form of thin sheets.

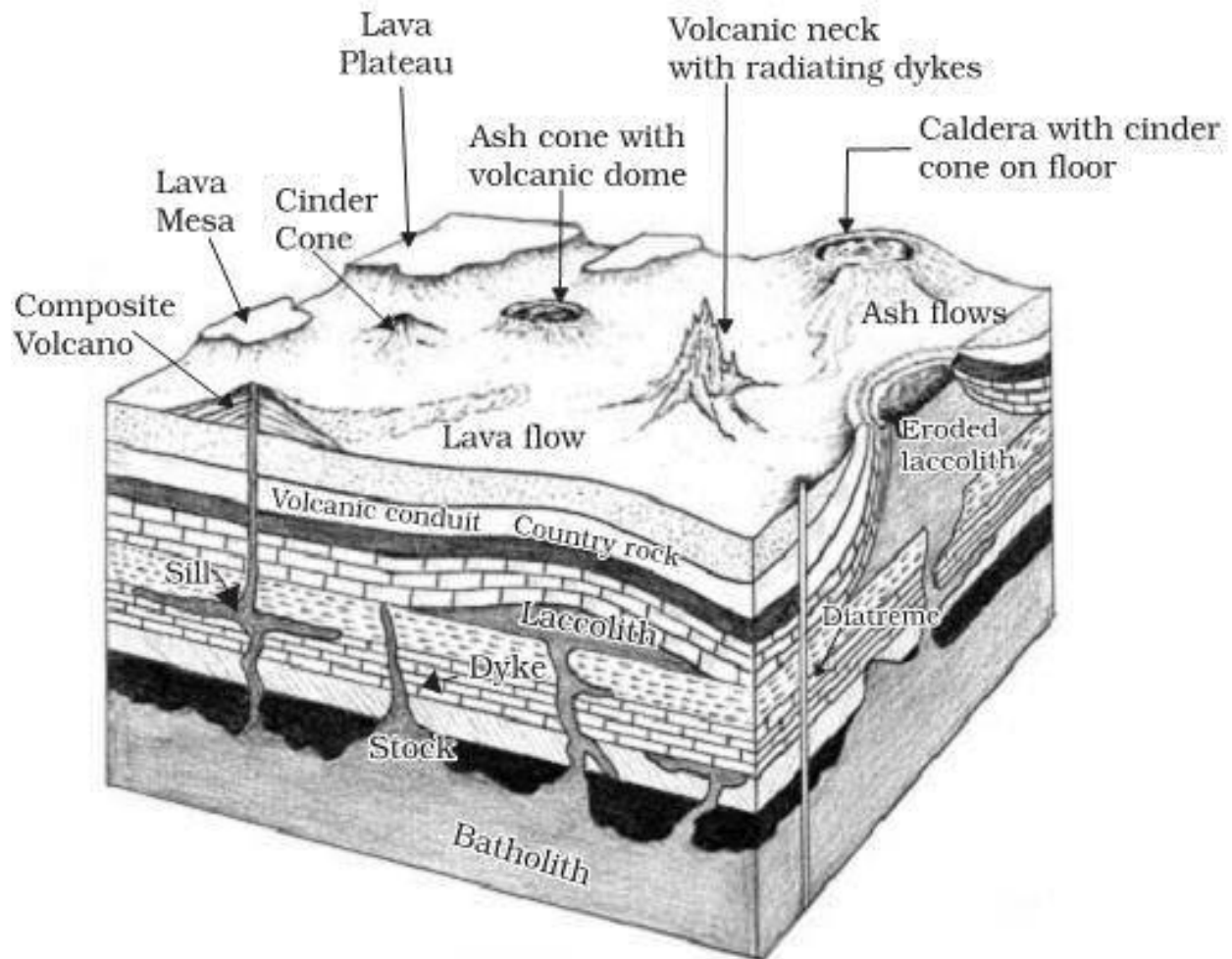
**Acid Lavas** – Unlike basic, acidic lavas are highly viscous and have a high melting point. They are light-coloured due to the presence of silica and are also of low density. They are highly explosive and spreads very less.

1. **Cinder or ash cones:** Loose particles gets accumulated and deposited around the vent. The size increases due to continuous accumulation. Fine particles get deposited around the outer margin whereas larger particles are arranged near the crater. These occur generally in acidic lava and hence they are explosive.
2. **Composite Cones:** As the name suggests, they contain the arrangement of various types of lavas arranged in the layers. They are among the highest volcanoes formed. Generally, the lavas are more viscous and explosive.
3. **Shield Volcanos:** These are formed entirely of basic i.e. very fluid lavas. They resemble a warrior shield lying on the ground and hence are named as such. Except for the basalt flows, shield volcanoes are the largest volcanoes in the earth.
4. **Craters:** These are funnel-shaped depressions formed at the mouth of the volcanic vent. Calderas are the volcanoes with greatly enlarged depressions. The larger eruptions in this type of volcanoes get subsided in the magmas beneath. Water gets collected in the depressions forming caldera or craters lake.
5. **Flood Basalt Provinces:** These are formed when lavas with very high fluidity are outpoured by volcanoes which travel for large distances. They spread thousands of square km in many parts of the world. Also, they can reach up to a thickness of 50 m which series of flows. One of the prominent examples is the Deccan trap of the Maharashtra plateau.

## Intrusive landforms

The magma sometimes couldn't reach the surface of the earth and hence gets solidified within the crust. This gives rise to several structural landforms as below:

1. **Batholiths:** These are structured like large domes, are long, irregular and undulating. The body of large magmas gets cooled within the deep crust of the earth. When denudation occurs for a larger time, removing the overlying material, they come to the surface of the earth. Sometimes the depth may reach hundreds of km. These are granitic bodies.
2. **Laccoliths:** These landforms are mushroom-shaped or dome-shaped formed due to intrusion of the magma into the porous horizontal sedimentary planes.
3. **Phacoliths:** The intrusion of the acidic magma into the synclines and anticlines of fold mountains give rise to these landforms.
4. **Lapoliths:** The solidification of magma into saucer-shaped basins gives rise to the lapoliths.
5. **Sills and Sheets:** These are intrusive landforms in the igneous rocks. This usually lies parallel to the bedding planes of sedimentary rocks. As the name suggests, thinner deposits are sheets whereas thicker ones are called sills.
6. **Dykes:** These occur due to vertical solidification of magma. They are wall-like formations. Thickness varies from few centimetres to several hundred meters and length can be several kilometres.



Source: NCERT

There are few other landforms or features too associated with volcanoes like

1. **Pyroclasts:** These are volcanic fragments that are hurled through the air by volcanic activity.
2. **Geysers:** These phenomena are associated with a volcanic region or thermal region where water gets heated above the boiling point. These get sprouted as superheated steams or fountains of hot water reaching up to a height of 150 Meters. Three places, New Zealand, Iceland, and Yellowstone park of USA contains almost all the world's geysers.
3. **Hot Springs:** These may be found in any part of the earth where water seeps deep inside to reach the interior enough to get heated

by the interior forces. There are no explosions in the rise of water and they contain medicinal values.

4. **Fumaroles:** It is a vent emitting gas and water vapour but is not regular. It occurs at certain intervals. These are said to be the last signs of activeness of any volcano.

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