

Quadrant II – Transcript and Related Materials (Notes)

Programme	: Bachelor of Science (First Year)
Subject	: Geology
Paper Code	: GEC 102
Paper Title	: Introduction to Petrology
Unit	: 1
Module Name	: Structures (Block lava, Ropy lava, Pillow and Flow structures)
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Notes:

Pillow & Flow structures, Ropy & Blocky Lava

- These are structures developed in the igneous rocks due to difference in mobility of magma or lava, which in turn depend on the temperature, viscosity, composition and amount of gasses in the magma.

Blocky Structure

- These result from the extrusion of highly viscous, gas poor or “dry” andesitic and rhyolitic lava. Since the viscosity is so high, they undergo very little movement from the vent, after the eruption, but instead piles up over the vent after cooling.
- Blocks of nearly solid lava break off the outer surface of the dome and roll down its flanks to form a breccia around the margins of domes.
- Blocky lava contain larger lava blocks with smoother sides and angular edges. Their surfaces show broken and fragmented appearance.

Ropy Structure

- Lavas of Basic composition being mobile flows for considerable distance due to low viscosity and upon cooling due to the flow process causes a skin to form.
- Such lava flows that initially have a smooth surface are called pahoehoe flows.
- Initially the surface skin is smooth, but often inflates with molten lava moving underneath and expands to form *pahoehoe toes* or rolls to form *ropey pahoehoe*.

- The upper surface is thus smooth and wrinkled forming Ropy structures.

Pillow structure

- When lava erupts on the sea floor or other body of water, the surface skin solidifies rapidly, while the lava beneath remains hot and capable of flowing and, like with pahoehoe toes inflates with molten lava. But further flow is possible only when the crust formed at the top ruptures. The rupture occurs at the margins of previously congealed oval mass; from such ruptures lava flows out and cools down again forming fresh bulbous tops. This process is repeated producing overlapping bulbous masses.
- Pillow lava is usually basaltic in composition and always associated with water. These are produced by extrusion of lava into rain-soaked air, beneath ice-sheets, at mid oceanic ridges, under water logged sediments or in sea water. Each pillow is like a bag that has quickly chilled margin which is filled with molten material.
- These form part of a classic ophiolite sequence.

Flow Structure

- No lava is homogenous during and immediately after extrusion, Layers and patches in it differ slightly in composition, gas content, viscosity and degree of crystallization. In the process of flow these patches are drawn out into parallel lenticles', streaks, bands and lines manifested by slight difference in colour and texture
- Flow structures are defined by development of parallel or nearly parallel layers or bands or streaks in the body of an igneous rock. The parallelism is caused by the flow of magma or lava during the process of crystallization.
- Sometimes the already crystallised particles within the magma are arranged parallel to the direction of flow of the lava. They naturally indicate the direction of flowing of the mass, prior to its consolidation.