Quadrant II – Transcript and Related Materials

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Notes

Hypabyssal Igneous rocks

There are two types of igneous intrusions- major and minor. Solidification of major intrusions results in Plutonic igneous rocks while minor intrusions form hypabyssal igneous rocks. When the magma solidifies on its way to the surface of the Earth at shallow depth the resulting rock is called as Hypabyssal igneous rock. The rate of cooling of magma at shallow depths is rapid at the contact with the country rock but it is relatively slow inside the body. Therefore, such rocks are usually medium grained. They are exposed on the surface of the earth after erosion of the overlying rocks.

Hypabyssal rocks occur as dykes, sills, ring dykes, cone sheets, phaccoliths, laccoliths and volcanic necks.

Dyke

Dyke is a shallow igneous intrusion discordant with the stratification/foliation of the country rock. It is a tabular, wall-like body usually vertical to nearly so at the time of intrusion. Dykes vary in thickness from few cm to few meters and are few hundred meters to few kilometers long. They are mostly medium grained except at the contact with the country rock. They show closely spaced joints at the contact but widely spaced along the axial region. Most of the dykes are

dolerites in composition. There are many such dolerite dykes along the coast of Goa.

Dykes usually occur as a dyke swarm i.e., a number of parallel to sub-parallel dykes occur together. Dyke swarms are intruded when a portion of the Earth's crust is subjected to tension. However, some are radially disposed dykes about a plutonic centre. Here the tension results from the thrust of the magma against the roof resulting in radial fractures. Sometimes a fracture is intruded multiple times. Such dykes are called multiple dykes, if the same fracture is intruded many times with the same magma type. They are called composite dykes if the same fracture is intruded many times with different magma types.

Sill

Sill is a shallow igneous intrusion of mobile magma concordant with the structure of the country rock. They are tabular sheet-like bodies usually horizontal to nearly so at the time of intrusion. They are few meters thick and extend over few sq. km. in area. They are medium grained except at the contact with the country rock and also show closely spaced joints at the contact but widely spaced along the axial region. They intrude when overlying pressure is less than that of the intruding magma. Most of the sills are usually dolerite.

Ring dykes

Dykes which show arcuate outcrop are called ring dykes. The inner and outer walls of the intrusion may be parallel or have different degrees of curvature which converge forming a crescent outcrop. Occasionally the rings are complete. The most important feature of ring dykes is that their walls are vertical or steeply dipping outward. They are formed when magma occupies fractures formed due to collapse of the roof of the partially empty magma chamber. In ring complexes, several ring dykes are arranged concentrically around a centre. E.g. Carbonatites

Cone sheets

Cone sheets are dykes which show arcuate outcrop but their walls are vertical or steeply dipping inward. The inner and outer walls of the intrusion may be parallel or have different degrees of curvature which converge forming a

crescent outcrop. Occasionally they form complete rings. Cone sheets are formed when magma occupies fractures that it generates while up arching overlying rocks. When the magma chamber is dome shaped the cracks that develop due to tension are curved, circular and spread upwards

Phaccolith

Phaccolith is a lens shaped concavo-convex shaped intrusion parallel to the bedding plane along axial region of folds. The crest of anticlines and trough of synclines are areas of low pressure compared to the limbs of the fold and therefore it is easy for magma to intrude through these regions. Th rocks are usually mafic in composition and such bodies are not found commonly.

Laccolith

When viscous magma causes uplift and up arching of the overlying strata above the intrusive igneous body in the form of a dome a plano-convex lens-shaped body (convex upwards) is formed. This is called a laccolith. They are circular in outcrop when exposed and have domical shape. The rocks are usually felsic.

Volcanic neck

Volcanic necks are also called volcanic plugs. The pipe-like opening (vent) that connects the magma chamber to a volcano may be filled with the lava or the pyroclastic material. After erosion of the overlying volcanic rock this pipe-like body may get exposed and is called volcanic neck.