Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

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Paper Title: Introduction to Petrology

Unit: 2

Module Name: Study of mineral composition, textures and mode of occurrence of Gabbro, Dolerite and Basalt

Module No: 16

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Notes

Gabbro, Dolerite and Basalt

Igneous rocks are broadly classified into four groups as Felsic, Intermediate, Mafic and Ultramafic rocks. This classification is based on essential mineral content. Gabbro, Dolerite and Basalt belong to Mafic Igneous group. The essential minerals in Mafic igneous rocks are calcic plagioclase and pyroxene/olivine. The essential minerals in gabbro, dolerite and basalt are calcic plagioclase and clinopyroxene (augite).

The mineral composition of all these three rock types is same. The difference between them is the mode of occurrence. Gabbro is plutonic igneous rock- coarse grained. Dolerite is hypabyssal igneous rock- medium grained. Basalt is volcanic igneous rock- fine grained.

Gabbro is a plutonic igneous rock essentially made up of calcic plagioclase and augite. Dolerite is a hypabyssal igneous rock essentially made up of calcic plagioclase and augite. Basalt is a volcanic igneous rock made up of calcic plagioclase and augite. The common accessory minerals are biotite, magnetite, ilmenite, etc.

Chemically, they have relatively low amount of silica (SiO_2) content (between 45-52%). They are also relatively poor in alkalis (K and Na). They are rich in Fe, Mg and Ca.

Mode of occurrence and textures of Gabbro

Gabbros are quite common in occurrence. Most gabbros occur as stocks or bosses. However, some form major part of large layered igneous complexes. They rarely occur as large batholiths. Gabbros are holocrystalline, coarse grained rocks. They mostly show hypidiomorphic texture wherein most minerals are equigranular and sub-hedral in shape. The gabbros in layered complexes show cumulate texture wherein early formed minerals in a magma chamber settle under the influence of gravity.

Mode of occurrence and textures of Dolerite

Dolerites are the most common hypabyssal rocks. They mostly occur as dykes. However, some occur as sills, phaccoliths, volcanic necks, etc. Dolerites are holocrystalline to hemicrystalline, medium grained rocks. They show various textures such as ophitic, sub-ophitic, porphyritic, intergranular, intersertal, etc

Mode of occurrence and textures of Basalts

Basalts are the most abundant volcanic igneous rocks on the surface of the earth. Entire oceanic crust and a substantial portion of continental crust is made up of basalts. They occur in different tectonic settings. They usually form large lava flow plateaus, shield volcanoes, volcanic cones, etc**.** Basalts are mostly hemicrystalline and fine grained; but sometimes holocrystalline. They show various textures such as allotriomorphic texture, sub-ophitic, porphyritic, intergranular, intersertal, pilotaxitic, etc**.** They also show structures such as ropy, blocky, pillow, vesicular, amygdaloidal, etc