

A PRELIMINARY PETROGRAPHICAL AND GEOCHEMICAL STUDIES ON DOLERITE (DIABASE) DIKE AT GALLODAI, SRI LANKA

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Abstract

Dolerite (Diabase) is a mafic, holocrystalline igneous rock formed under sub-volcanic geological settings. Such dolerites are exposed in the Vijayan Complex of Sri Lanka as dykes. Despite the studies on petrography, intrusive age and geophysical settings of Sri Lankan dolerites, a little attention has been paid to interpret the intrusive settings and economic significance of those. Therefore, this study aims to characterize the mineralogy and chemistry of the dolerites exposed at Galodaya, Padiyathalawa, Sri Lanka in order to understand their formation condition and to estimate the economic potential. Dolerite samples were collected from the Galodaya outcrop during field geological investigations and those samples were analyzed for their mineralogy and chemistry using petrographic microscope, X-Ray Diffractometer (XRD) and X-Ray Fluorescence spectrometer. The studied dolerites are finer to medium grained dark gray coloured rocks showing equigranular texture. Petrographically, these rocks are predominant with plagioclase and clino-pyroxenes with subordinate magnetite, hornblende, quartz and microcline. Sericite and chlorite are found as the secondary products, which may have been formed due to chemical alteration of plagioclase and clino-pyroxene respectively. The XRD results confirmed the presence of labradorite as plagioclase and, both diopside and pigeonite as clino-pyroxenes. Chemically, the rocks are composed majorly of SiO₂, Al₂O₃, Fe₂O₃, MgO and CaO. These compositions represent the marginal composition between intermediate to basic (52 wt. % of SiO₂) whereas typical dolerites are basic in composition. Therefore, these rocks may have been formed at hypabyssal condition with moderate cooling rates allowing the formation of fine to medium crystal grains with holocrystalline texture. Similarly, the rocks composed comparatively higher concentration of Fe₂O₃ (13.19 wt %), and the average content is comparable to that of iron ore tailings. Hence, these rocks would be applied as raw materials for iron-based industries. Further studies are required to model the emplacement history together with crystallization sequence of these dykes.

Keywords: Dolerite, Diabase, Petrography, Hypabyssal, Economic Potential