Using mineral chemistry for determination of crystallization conditions and tectonic setting of diabasic intrusive rocks from Deh-Zahir Area (West of Rafsanjan)

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Abstract: In the northern part of Kerman Volcanic Belt, southwest of Rafsanjan (Deh-Zahir area), a series of diabasic intrusives have intruded into the Eocene andesitic lava flows and pyroclastic rocks. These plutons occur as irregular shaped bodies (up to 8 m in diameter) and dikes (up to 4 m in thicknesses). They show ophitic, sub-ophitic, and porphyritic textures and their major minerals include plagioclase (bytownite), and clinopyroxene (diopside), with titanomagnetite as secondary mineral. Based on the petrographic characteristics, presence of the enclaves and chemical variations from core to rims of the pyroxenes and plagioclases suggest that the parent magmas probably tolerated magma mixing processes. Geothermobarometric studies on the clinopyroxenes indicate a temperature range of 1050-1200°C and pressures of more than 2 kbar. Accordingly, beginning of the clinopyroxenes crystallization can be considered approximately at the depth of 20 Km, i.e. in the middle crust. Furthermore, these evidences show that the oxygen fugacity was low and water vapor pressure was less than 10 kb during the crystallization of clinopyroxenes in the diabase rocks. Based on the chemical compositions of the clinopyroxenes, the primary magmas for these rocks had been calc-alkaline in nature and formed in a volcanic arc setting.

Keywords: Mineral chemistry; geothermobarometry; diabasic intrusions; volcanic arc; Deh-Zahir area.

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