

Geochemical and textural characteristics of plagioclase as evidence for open-system processes: Case study from Bazman volcano (SE Iran)

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Abstract: Textural and Geochemical characteristics of plagioclase phenocrysts in Andesitic and basaltic rocks of Bazman volcano (from Makran volcanic arc) show evidence of interaction between basaltic and andesitic magmas. Plagioclase phenocrysts in andesites and basalts are composed of three major parts of core, mantle and rim, with similarity of the anorthite contents in cores and mantles. The cores of the phenocrysts, which seem to be in equilibrium with the andesitic magma rather than the basaltic one (An_{39-60}), exhibit different styles of oscillatory zoning. The trace element (Fe, Mg, Sr, Ba) concentrations in different zones of the cores also remain constant or change proportional to the anorthite content and may exhibit dynamic processes in the magma reservoir during the core formation in andesitic magma. The engulfed cores and sieve texture in the mantles of plagioclases may have formed in response to changes in temperature and composition of the surrounding melt. Elevated anorthite content of plagioclases (An_{40-65}), accompanied by jump of the Fe, and Mg content, in addition to change in the patterns of Sr, and Ba in the sieve-textured mantle may show the replenishment of magma reservoir by new basaltic magma. Increase of An in the rim of basaltic plagioclases (from An_{53} to An_{74}) and decrease of An in the rims of andesitic plagioclases (from An_{69} to An_{53}), indicate that the two magmas gained their contrasting compositional identity most probably as a result of sudden upward movement. These constraints, along with other evidence like weakly-zoned pyroxene microphenocrysts with rounded rims, suggest that the rocks originated in the course of replenishment of mafic melts either with chemical or/and thermal interaction of the melts.

Keywords: *Makran; Open system processes; trace element; mineral zoning; magma replenishment.*

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