

Mineralogy of Silicic Lavas from Isbil Strato-Volcano, Dhamar – Radá Plio-Quaternary Volcanic Field, Yemen Republic: Implications for the Origin of Rapakivi Texture

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The Isbil strato-volcano located in the eastern part of Dhamar-Radá Plio-Quaternary volcanic field, SE Yemen is considered to be the largest well developed preserved silicic lavas in Yemen volcanics. These silicic lavas represent the eastern part of Isbil volcanic complex. The Isbil strato-volcano collapsed to form a caldera rims interslicing by NNW-SSE faults and fractures that were feeders for an cinder cones and silicic lava flows. In some places, a pyroclastic pumic-flow with unsupported obsidian lithic fragments are well recognized.

The study silicic lavas consist of rhyolitic obsidian with vesicular and laminted textures together with mixed dacite lavas and trachyte as well as their tuffaceous rocks. The mixed dacite lavas contain sanidine mantled by oligoclase that closely resemble rapakivi feldspars in granites. Resorption and mantling of sanidine by plagioclase is one of many disequilibrium textures in these lavas resulting from mafic-felsic magma interaction.

Regardless of the exact cause of K-feldspar instability, texture evidence from volcanic rocks indicates that development of rapakivi texture is controlled by cation diffusion in dissolution boundary layer developed on K-feldspar. Mantles appear to form in a two-stage process that involves initial epitaxial nucleation of plagioclase on sanidine, followed by simultaneous dissolution of sanidine and inward growth of plagioclase.

Sanidine mantled by plagioclase in silicic lavas from Isbil volcano demonstrates a magmatic origin for rapakivi texture. Moreover, textural and chemical evidences indicate that these lavas formed by mixing of sanidine-bearing rhyolitic magma with basaltic andesite magma.

Keywords: Silicic lavas, mantling of sanidine by plagioclase, rapakivi texture, Isbil Volcano, Yemen.