Exploring the preservation of alkaline-carbonatitic extrusive rocks in relation to continent formation

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Mineral reaction paths related to continental alkaline-carbonatitic extrusive rocks are examined in the context of a "zeolitic masquerade" hypothesis [1]. The hypothesis suggests that zeolitic alteration reactions are the first steps in a gradual stabilization of these bedded successions, as the highly reactive volcanic deposits change from glasses via zeolites to authigenic feldspars, clays and SiO_2 phases. Reported reaction progressions are suggestive of trends in which Si/Al increases with time as wider, Si-saturated fluids react with earlier-formed phases in continental environments. It is not known how trace elements such as the REE and HFSE behave at each stage of reactive progression as no systematic study of these elements has been made for wide occurrences of natural zeolites. But our preliminary data indicate that the first-formed, low-Si zeolites (e.g. phillipsite), reflect the REE patterns of the original volcanic glasses. Modifications to trace element signatures of altered successions are very likely to occur as reactions progress with exposure to wider crustal fluids. Some of these modifications will be dependent on the ion-selectivity properties of different zeolite minerals in the reaction paths, but fluid controls are certainly evident. A preliminary exploration of possible examples in the geological record, of recognition and stabilization of reactive successions, is discussed.

[1] Campbell *et al* (2012) *Mineralium Deposita*, **47**, 371–382.

Sodium rich magmas parental to Catanda carbonatitic lavas (Angola): Melt inclusion evidence

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Remains of highly eroded carbonatitic volcanic edifices occupy a region of 50 km^2 in the vicinity of the Catanda village, Kwanza Sul province, Angola. Carbonatitic lava flows and pyroclastic deposits are present in the area forming sequences of volcanic materials up to 600 metres in thickness.

We have studied the composition of the melt inclusions preserved in the primitive mineral phases of the lavas such as calcite, apatite, Na-rich cuspidine and spinel. Most inclusions are composed by calcium carbonates enriched in Na (up to 18 wt.%), K (up to 7 wt.%) and with significant S contents (Fig.1a). Alkaline chlorides such as sylvite and halite can be also found among daughter phases (Fig.1b), as well as periclase, olivine, monticellite and clinopyroxene. Na-rich apatite, perovskite and pyrochlore are also found in this assemblage, arguing for important role of alkalis and fluorine.

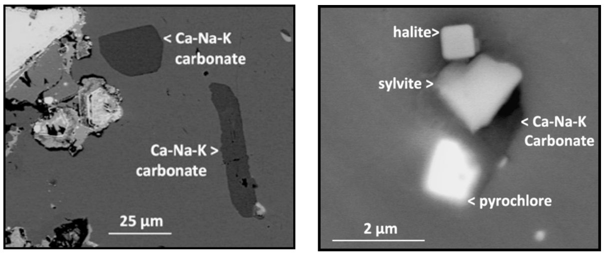

Figure 1: a) Calcium-alkaline carbonate included in calcite. b) Alkaline chlorides, carbonate and pyrochlore inside calcite.

The presence of alkalis in the melt inclusions hosted by main phenocryst mineral suggests that the parental magma compositions were Na- and K-rich. We consider that postmagmatic processes removed much of the alkaline elements from the Catanda lavas.

www.minersoc.org
DOI: 10.1180/minmag.2013.077.5.3