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Carbonatic melt and its genetic link with ultropotassic rocks of the Dunkeldyk complex, southeastern Pamirs (Tajik Republic)

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Alkaline basaltoids - fergusites are the least evolved rocks of the Dunkeldyk potassium-rich alkaline complex of the southeastern Pamirs (Tajik Republic). The complex is bordered by the Rushan-Pshart fault on the north and the Gunt-Alichur fault on the west. The occurrence of potassium-rich alkaline magmatism was related to the Neogene stage of the magmatic history of the region. The complex includes carbonatitic dikes. We studied of fergusites with carbonate veinlets. Phenocrysts of clinopyroxene from the rock and carbonatite veinlets bear primary melt inclusions. Clinopyroxene from the veinlets contain cogenetic silicate, carbonate, and combined silicate-carbonate inclusions. The mineral assemblages of crystallized inclusions and carbonatic groundmass of veinlets are identical: aegirine, phlogopite, kalsilite, garnet, and feldspars, apatite and Sr- apatite, scapolite, fresnoite, microsommite, jerfisherite, zeolites and Ba-Sr-bearing carbonates. The melting of daughter phases in the carbonate inclusions begins at 450-500^{o}C. After melting of all daughter phases at 1020-1150^{o}C, the inclusions consist of silicate melt with droplets of carbonatite melt. Each of the two melts contains its own gas bubble (fluid phase), which disappear simultaneously during subsequent heating. The pressure of primary magma crystallization was estimated as about 0.7 GPa. The major- and trace-element compositions of silicate parts of silicate-carbonate inclusions from clinopyroxene of the veinlets and silicate melts from the early clinopyroxene phenocrysts of the rock are identical. They contain up to 48 wt.% SiO2, 16 wt % K_2O+Na_2O with K_2O/Na_2O up to 4 and are enriched in LREE (La_N/Yb_N up to 41), Ba, Th, and U, with sharp minimum Nb, Ta and Ti normalized to primitive mantle. The glasses contain substantial amounts of H_2O (up to 2.1 wt %), S, F, and Cl. Our experimental observations and analytical results suggest

that the fergusites were formed from silicate magma *after* extraction (immiscibility) of carbonatitic liquid. The composition of the carbonatitic melt was estimated from the volume proportions and compositions of daughter phases in melt inclusions, and also from coefficients of partition of elements between carbonate and silicate melts. A comparison of our results with data on the composition of carbonate-saturated mantle melts and carbonate-bearing alkali rocks of different tectonic setting suggests that the carbonatitic melts were separated from the primary picritic magma enriched by incompatible elements under crustal conditions.