

Crystal chemistry of phlogopites from ultrapotassic rocks with lamproitic affinity from the Western Mediterranean Region: a preliminary study.

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Lamproitic to calc-alkaline rocks in the Western Mediterranean basin are found in four restricted areas and represent different magmatic events at the active continental plate margin. These events occurred at different stages of the tectonic evolution of this region: during Oligocene (from 33 to 29 Ma) in the Western Alps, Italy; during Mio–Pliocene (from 14.2 to 4.6 Ma) in Corsica, France, and nearby Capraia Island; during Miocene (from 11.7 to 6.3 Ma) in Murcia and Almeria, South-Eastern Spain; during Plio–Pleistocene (from 4.1 to 0.88 Ma) in Southern Tuscany, Central Italy. Relatively to mantle-derived primary magmas, these ultrapotassic rocks show high K_2O and low Al_2O_3 , Fe_2O_{3tot} , CaO and Na_2O while MgO , Ni and Cr are within the typical values. They have high K_2O/Al_2O_3 and, generally, $[(Na_2O+K_2O)/Al_2O_3] < 1$. These rocks can therefore be classified as lamproites [1]. Olivine, phlogopite, clinopyroxene and K-feldspar are always present. Phlogopites in these rocks have high but variable amounts of titanium, barium and fluorine and may provide information about the origin and crystallization conditions of the host rocks.

The crystal chemistry of 1M phlogopites from Western Alps and Southern Tuscany is being investigated by single crystal X-ray diffraction. Unit-cell parameters vary in the range $a = 5.301 - 5.313 \text{ \AA}$, $b = 9.184 - 9.202 \text{ \AA}$, $c = 10.105 - 10.207 \text{ \AA}$ and $\beta = 100.00 - 100.23^\circ$. The wide dispersion of values observed for the c parameter looks to be due to the different degree of substitutions occurring at the anionic O4 site. The structural features obtained from refinements ($R_1 = 0.0365 - 0.0574$) indicate that major substitutions are $OH^- \leftrightarrow F^-$ and Ti-oxy substitution (${}^VI M^{2+} + 2(OH)^- \leftrightarrow {}^VI Ti^{4+} + 2O^{2-}$). The incorporation of titanium and fluorine through these substitutional mechanisms results in a reduced repulsion between the cation in the interlayer site and the hydrogen of the hydroxyl at the O4 site; this produces, as a consequence, smaller values of c parameter. According to these preliminary data, the most dehydrogenated samples appear to be those from Southern Tuscany.

[1] Foley et al., 1987; Earth Science Rev. 24, 81