

Alessandro Fabbrizio – The most important works

Fabbrizio, A. 2019. An investigation on the zoning associated with divalent elements, P, Cr, Al and Ti in olivines from the Kilauea Iki lava lake (Hawaii). *Periodico di Mineralogia*, 88, 185-201.

In this work I studied the residual chemical zoning preserved in olivine crystals from samples recovered during the drill of the Kilauea Iki lava lake performed in 1981 by the USGS. Two different kinds of zoning were discovered. A concentric zoning involving Fo contents and minor divalent elements such as Ni, Mn and Ca was developed in response to the cooling process. An additional skeletal zoning involving trace elements such as P, Ti, Al, and Cr was caused by the rapid growth of olivine during the cooling of the lava lake. The observed features together with the absence of reverse zoning and of resorption rims in olivine crystals, support the idea that the cooling of the Kilauea Iki magma body happened in a situation resembling to an ideal closed system.

Fabbrizio, A., Schmidt, M.W., Günther, D., Eikenberg, J. 2009. Experimental determination of Ra mineral/melt partitioning for feldspars and ^{226}Ra - disequilibrium crystallization ages of plagioclase and alkali-feldspar. *Earth and Planetary Science Letters*, 280, 137-148.

The partition coefficients (D) mineral/melt for radium and other trace elements have been experimentally determined for the pairs plagioclase/melt and alkali-feldspar/melt with the aim to determine the true fractionation of Ra from Ba during mineral crystallization and its influence on the Th-Ra-Ba model ages. On the basis of the experimental results two equations, one for plagioclase and one for alkali-feldspar, permitting to estimate the ratios $D_{\text{Ra}}/D_{\text{Ba}}$ as a function of the anorthite and of the orthoclase contents of the minerals were proposed. These equations were then used to recalculate the Th-Ra-Ba model ages for several volcanic systems including those for which the calculated ages were based on the incorrect assumption that $D_{\text{Ra}} = D_{\text{Ba}}$. In general the recalculated crystallization ages were from 20 to 90% shorter than the originally calculated ones.

Fabbrizio, A., Carroll, M.R. 2008. Experimental constraints on the differentiation process and pre-eruptive conditions in the magmatic system of Phlegraean Fields (Naples, Italy). *Journal of Volcanology and Geothermal Research*, 171, 88-102.

Explosive volcanic events can have devastating impact on an area inhabited by about 1.5 million people such as the Phlegrean Fields Caldera. In an area with such characteristics, the definition of pre-eruptive conditions is crucial for understanding the behavior of the system and for mitigating the volcanic risk. This experimental study focused on phase equilibria for a differentiated trachytic magma belonging to an explosive eruption that occurred about 20 ky ago inside the Phlegrean Fields Caldera. The results of the phase equilibrium experiments permitted to explain the observed compositional variations in natural samples and to determine the range of T - P conditions at which these magma bodies were stored prior to eruption.

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