

Thermometry of amphibole-plagioclase assemblages in granitoids and related rocks: a recalibration of the calcic amphibole-plagioclase NaSi–CaAl exchange thermometer

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The amphibole-plagioclase NaSi–CaAl exchange thermometer from Holland and Blundy [1] and the amphibole-only thermometers by Ridolfi and Renzulli [2] and Putirka[3] are evaluated in this work using an amphibole-plagioclase database with ca 185 compositional data, compiled from a large number of published experimental works. We detect important inaccuracies in both methods: temperatures calculated with the amphibole-plagioclase thermometer can be underestimated by up to 140-200°C for $T > 780^{\circ}\text{C}$, whereas those obtained by amphibole-only thermometry can be overestimated by up to 150-250°C. In this work (see also Molina et al. [4]), we calibrate new expressions of the calcic amphibole-plagioclase thermometer that correct for the reported inaccuracies and present an overall precision of ca. $\pm 50\text{--}60^{\circ}\text{C}$. When applied to natural assemblages from high-grade metamorphic terranes and granitoid plutons, we notice that crystallization temperatures could be, on average, 100°C lower than those given by amphibole-only thermometry.

[1] Holland and Blundy (1994) *Contributions to Mineralogy and Petrology*, 116, 433–447; [2] Ridolfi and Renzulli (2012) *Contributions to Mineralogy and Petrology*, 163, 877–895; [3] Putirka (2016) *American Mineralogist*, 101, 841–858; [4] Molina et al. (submitted) *American Mineralogist*.