Exsolution in oscillatory zoned alkali feldspar from the Weinsberg Granodiorite

Käßner, Stefan[1] Abart, Rainer[1] Milke, Ralf[1]
[1]Freie Universität Berlin, Institut für Geologische Wissenschaften, Malteserstrasse 74-100, 12249 Berlin

The Weinsberg granodiorite of the Moldanubian zone in Lower Austria contains up to several centimeter sized idiomorphic alkali feldspar with pronounced oscillatory zoning. The zones reflect the idiomorphic crystal shape and are interpreted as growth features. The zones vary in bulk composition between X_{Or} = 0.5 to 0.9. The anorthite content is correlated with sodium concentration, and it is up to 15 mole% in the most sodium-rich zones. Zones with an integrated bulk composition of X_{Or} = 0.5 to 0.7 show exsolution of an albite-rich phase. The exsolved precipitates have a composition of X_{An} = 0.27 to 0.28 and are practically devoid of orthoclase component. The exsolution features take the shape of spindles and blebs of 1 to 10 μm width and up to 30 μm length. Depending on the integrated bulk compositions of the chemically distinct zones the modal abundances of the albite-rich phase vary significantly between the different zones. The integrated bulk compositions all lie off the thermal maximum of the solvus of the alkali feldspar system on the relatively shallow, orthoclase rich limb. It is hence hypothesized that exsolution occurred by a nucleation/growth mechanisms rather than by spinodal decomposition for all zones. From the geometry of the solvus it is predicted that, the more potassium rich the bulk composition of a zone, the later the respective zone enters the solvus. This is reflected by a decrease in the characteristic size of the exsolution features with increasing bulk orthoclase content. The relation between integrated bulk composition and characteristic size of the exsolution features gives insight into the coarsening kinetics of the exsolved precipitates.

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email: **abart@zedat.fu-berlin.de**
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