

Na / K Exchange Between and a salt Vapour

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For studies of unmixing processes in natural potash feldspars experiments were made to synthesize homogeneous feldspars of intermediate composition. This was done by exchange between feldspar crystals and NaCl / KCl vapour at a temperature of 850°C for a duration of up to two weeks. The starting material of the first series of experiments was a sanidine from the Eifel with X_{Or} 0.82. A second series was done with Amelia albite. The salt mixtures and the feldspar grains were placed in an evacuated and sealed quartz glass tube. To avoid direct contact between the molten salt and the feldspar the grains were put in a gold tube with an opening at the top (Kroll, H, personal communication). The gold tube rests on a notch in the glass tube and is not in contact with the molten salt.

The exchange reaction in most of the experiments was incomplete. Different types of microstructures were discovered, depending on the composition of the salt mixture. Reactions between sanidine and a KCl rich salt produce a 10 – 20 μm wide potassium enriched rim, with a smooth exchange front toward the pristine grain interiors. After exchange with pure KCl the front is relatively sharp and it becomes successively more diffuse when the KCl weight fraction is reduced to 0.9 and 0.8. Exchange between sanidine and NaCl rich salt produces a system of parallel cracks. The spacing between the cracks depends on the composition of the salt and ranges from 5 – 40 μm . Only along these newly formed pathways sodium is able to enter the sanidine. The feldspar within a small area around the cracks forms a continuous transition from X_{Or} 0.30 near the crack surface towards the composition of the starting material in the interior parts of the feldspar. The thickness of this reaction zone depends on salt composition. The thickest zones were produced by reaction with pure NaCl and range in scale over a few μm . No significant exchange was discovered by using a balanced salt composition of half NaCl and half KCl.

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