

LA-HR-ICP-MS OF GRANITE PEGMATITE QUARTZ, K-FELDSPAR AND BIOTITE: ANALYTICAL STRATEGY AND RESULTS

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Trace element analysis of major minerals in granite pegmatite is a powerful approach to unravel the evolution and petrogenetic links between pegmatites and coexisting granites in regional pegmatite fields and is also important in developing exploration strategies for valuable high purity quartz which primarily is associated with this lithology. In the present study we applied LA-HR-ICP-MS analysis to characterise the trace element distribution in quartz, K-feldspar and biotite from 30 pegmatites in a 3000 km² area in South-Norway. Direct sampling were conducted with Finnigan MAT and Merchantek LUV266 UV-laser systems and the analysis of 40 different isotopes was processed by a Finnigan MAT ELEMENT high resolution mass spectrometer. Sampling from quartz was conducted directly from polished thick sections by single spot and raster analysis whereas K-feldspar and biotite separates were fused to glass disks with Li₂B₄O₇ before raster analysis. NIST 612, 614 and 616 and custom made fused quartz standards were used as standard material for quartz analysis with ²⁹Si as the internal standard whereas custom made spiked Li₂B₄O₇ standards were used in the analysis of K-feldspar and biotite where Ba comprised the internal standard. The trace element distribution in K-feldspar and biotite imply that granite pegmatites were derived from two distinctively different parental melts and that pegmatite forming melts became progressively more differentiated towards south in one of the fields. The trace element signature of quartz mimics the differentiation trends defined by biotite and K-feldspar and the economically best qualities of quartz are associated with the most primitive granite pegmatites.