

Geochemistry and petrology of granulite-facies rocks from Rogaland, SW Norway

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High-grade metamorphic ortho- and paragneisses are exposed in the proximity of the 0.9 Ga Proterozoic Rogaland anorthosite massif, SW-Norway. The study area is located 5-20 km northeast of the intrusive contact with the anorthosite. In this area, migmatitic opx-bearing granitic gneisses are the main rock type present, transected by metabasites as dykes. Minor migmatitic garnet-sillimanite-cordierite gneisses, quartzites, calc-silicate rocks, marbles, and rare sapphirine granulites occur as folded layers or discontinuous lenses in between large Opx-gneiss bodies. They aim of the present study was to elucidate the composition of the protoliths of the different rock units, to reconstruct their tectono-metamorphic evolution, and to investigate the influence of a possible contact-thermal overprint related to the emplacement of the Rogaland anorthosite massif.

Regarding their geochemical characteristics, the Opx-gneisses can be classified as granites, granodiorites and diorites. They are peraluminous in composition and mainly show I-type to S-type, post-collisional granite signatures. Protoliths of the metabasites are tholeiitic mid ocean ridge basalts, whereas those of the paragneisses mainly comprise arkosen and greywackes.

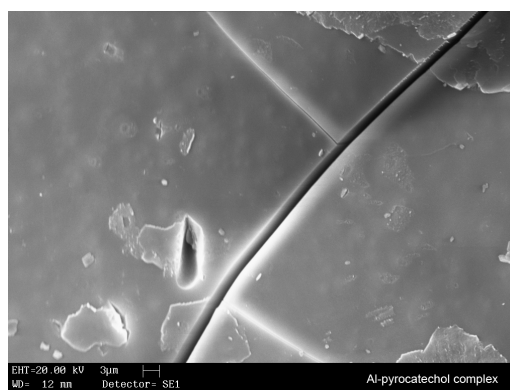
All rock units experienced high-grade regional metamorphism with associated ductile deformation and partial melting. The peak-metamorphic assemblage of the Opx-gneisses is garnet-orthopyroxene-plagioclase-quartz, whereas that of the metabasites is orthopyroxene-clinopyroxene-plagioclase-quartz. Retrograde biotite and amphibole define a strong foliation. For the thermobarometric calculations Opx-gneiss and metabasite samples from 5 km up to 20 km distance to the anorthosite contact were chosen. For all samples similar granulite facies peak-metamorphic conditions of 900 ± 100 °C at 6 ± 1 kbar are calculated, providing evidence against a contact-thermal effect related to the emplacement of the Rogaland anorthosite. Following this, contact-metamorphism induced by the anorthosite emplacement, as evidenced by pigeonite-in and osumilite-in isograds, is restricted to a distance of < 5 km to the contact.

Characterization of aluminum-pyrocatechol complexation in aqueous systems using ultraviolet-visible spectrophotometry and scanning electron microscopy

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The study was conducted by applying a 1:1 metal-ligand complexation at pH 3.5, 7.0 and 9.0 whereby $AlCl_3$ and pyrocatechol of the highest purity were used. The Al-pyrocatechol complex was synthesized in the presence of atmospheric pressure at 21 °C for a period of 48 h in total darkness after which the samples were determined by using methods of UV-Vis spectrophotometry and scanning electron microscopy (SEM).



Clearly, pure pyrocatechol is usually colorless in aqueous systems without autoxidation but its color changed completely to a dark cyan as a result of Al complexation. In particular, no visible change to the color of this complex was observed in the experiment conducted at pH 3.5, 7.0 and 9.0. In the UV region of the spectrum, the absorption maxima of pyrocatechol occurred at 212 nm and 275 nm when compared to the metal-ligand spectrum, here the absorption maximum occurred at 278 nm and the absorption intensity increased considerably. In the Vis region of the spectrum, ligand bands from the complex appeared with absorption maxima of 597 nm and 650 nm that conformed to the orange and red light regions. After the addition of auxochromes, a rise of the chromophore system occurred, and it was this effect that determined the shape of the UV-Vis spectrum of the Al-pyrocatechol complex. This compound, shown in its solid state, had a very smooth surface with sharp-edged breakages as presented in the SEM photomicrograph. Primarily, organic substances with o-hydroxy groups showed specific effects on Al chemistry in the environment due to their favorable reaction to Al chelation.

Reference

Franke M., (2002), diploma thesis, University of Trier, 187.