

Coronitic gabbros and associated basement rocks of the Valle Fértil – La Huerta Range, San Juan Province, NW Argentina

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The Sierra de La Huerta and Valle Fértil belong to the Western Sierras Pampeanas Range located in San Juan Province, NW Argentina. The Western Sierras Pampeana Range consists of metagabbro to metadioritic rocks that intruded the Proterozoic basement in the Early Middle Ordovician (Famatinian Orogeny).

The basement in the Valle Fértil –La Huerta range is represented by folded gneisses and migmatites, amphibolites, marbles, calcsilicates and associated tonalites – granodiorites to granite intrusives. The tonalites are more fine grained than the metagabbros and they are composed of Pl + Cpx + Opx ± Bt ± Am. Ol. The dominating gneisses consist mainly of Qtz – Pl – Bt – Grt – Sil – Crd ± Kfsp ± Sp ± Mag. They are strongly deformed and metamorphosed at granulite facies conditions. The magnetite often occurs as myrmekitic – like intergrowths within garnet. Spinel is hercynite with zinc concentration ranging from 7 to 17 wt % (gahnite component). The two pyroxene metagabbros show well preserved igneous textures and layering. They are composed of Pl (An₇₀₋₁₀₀) + Opx (En₈₅₋₆₀Fs₁₅₋₄₀Wo₀₋₁) + Cpx (Wo₅₀₋₄₀En₄₅₋₅₀Fs₅₋₁₀) + Ol (Fo₅₈₋₇₀) + Spl + Ilm + Mag. Spinel (an Al – rich hercynite) is found in the matrix, in the symplectites with amphibole and as exsolution lamellae in the Cpx. The Cr content in spinel is very low, and reaches 10 wt % Cr₂O₃ in the exolutions in Cpx. The amphiboles are mostly pargasitic hornblendes [K_{0,07}Na_{0,5}Ca_{1,9}Mg_{3,0}Fe²⁺_{0,9}Fe³⁺_{0,12}Al_{2,5}Ti_{0,09}Si_{6,2}O₂₂(OH,F,Cl)₂]. The presence of large amounts of symplectites (spinel – amphibole, plagioclase – amphibole) in most of the investigated coronitic gabbro samples may indicate an open system where diffusion and transport of elements has been possible (Mongkoltip and Ashworth, 1983).

Coronitic textures, which developed at Ol- Pl grain boundaries, are very common, composed of Ol → Opx → Cpx → Am ± Spl → Pl suggesting the reaction Ol + Pl = Opx + Cpx + Spl + Am. They are interpreted to be a result of slow cooling of the mafic – ultramafic body under high amphibolite to lower granulite metamorphic conditions. Metamorphic peak coincided with corona formation and was related to the Famatinian intrusive activity. Later, metagabbros were locally cut by narrow ductile shear zones associated with mylonitization.

Preliminary geothermometric calculations based on the mineral parageneses (Gt – Sil – Qz – Pl) in the high grade gneisses result in a pressure of 5–6 kbar at a minimum temperature of 850 °C. For the coronitic gabbros the temperatures range between 800–900 °C (Cpx – Opx Thermometer) at pressures around 5–6kbar.

This study is financially supported by the Austrian Research Fund to A.M. (FWF – P17350-N10).

Mongkoltip, P and Ashworth, J. R. (1983): Quantitative Estimation of an open system symplectite – forming reaction: restricted diffusion of Al and Si in Coronas around olivine. *Journal of Petrology*, Vol. 24, Part 4, 635 – 661