COMPOSITIONAL VARIATION OF Ba-RICH WHITE MICAS FROM TWO DIFFERENT GEOLOGICAL SETTINGS

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Ba-micas can occur in a variety of geological environments. The formation of Ba-rich micas is strongly influenced by the presence of hydrothermal fluids and thus can be classified as a product of metasomatic processes. Ba-rich muscovite/paragonite, so called ganterite, is a dioctahedral white mica represented by a 1:1 mixture between the true micas muscovite/paragonite and the hypothetical Ba brittle mica with an ideal composition of $[Ba_{0.5}(Na+K)_{0.5}]Al_2[Si_{2.5}Al_{1.5}]O_{10}(OH)_2$ (GRAESER et al., 2003; JAMBOR & ROBERTS, 2004). As the interlayer position is filled up to 50% by monovalent cations ganterite is a member of the true micas.

(1) The Ba-rich white micas of the first study occur in the Lienz contact aureole adjacent to the Oligocene Lienz/Edenwald tonalite in the surrounding fine-grained mica schists of the Austroalpine basement. Thermometric calculations for the innermost part of the aureole yielded temperatures of 640 ± 24 °C. The Ba content in the white mica reaches up to 13.38 wt.% BaO, even though Ba is not the dominant interlayer cation. The formula of a typical Ba-rich white mica is $[Ba_{0.37}K_{0.41}Na_{0.22}]_{1.00}[Al_{1.93}Mg_{0.02}Fe_{0.03}Ti_{0.02}]_{2.00}[Si_{2.66}Al_{1.34}]O_{10}(OH)_2$. Based on the chemical composition of the mica endmembers paragonite and muscovite, the Ba-rich mica in this study can be formed by a combination of the coupled substitution $[Ba][Al^{IV}]=[K]_{-1}[Si]_{-1}$ and the simple $[Na]=[K]_{-1}$ exchange vector. Complete solid solutions between muscovite and Ba-rich white micas were observed since Ba contents range from 0.07 wt.% up to 13.38 wt.% BaO.

(2) The Ba-rich white mica of the second study was found in the highly deformed marble belt close to the Meran-Mauls fault, which is part of the Giudicarie fault system. The marble layer occurs within the paragneisses of the Meran-Mauls Basement and has been overprinted under Variscan amphibolite-facies and eo-Alpine/Alpine greenschist-facies condition. The Ba-rich white mica is associated with celsian + barite + calcite + dolomite. The variation in the BaO content of the micas ranges from 0.49 wt.% up to 8.78 wt.%. As most of the white micas in this study are "phengitic", the incorporation of Ba can be described by the coupled substitution $[Ba][Al^{VI}][Al^{IV}]_2 = [K]_{-1}[Mg]_{-1}[Si]_{-2}$. The formula of a low Ba-mica (0.96 wt.% BaO) is $\square_{0.10}[Ba_{0.02}K_{0.86}Na_{0.01}Ca_{0.01}]_{0.90}[Al_{1.56}Mg_{0.42}Fe_{0.01}Ti_{0.01}]_{2.00}[Si_{3.48}Al_{0.52}]_{4.00}O_{10}(OH)_2$. This indicates a 50:50 composition along the muscovite – aluminoceladonite solid solution.

GRAESER, S., HETHERINGTON, C., GIERÉ, R. (2003): Canadian Mineralogist, 41, 1271-1280.
JAMBOR, J.L., ROBERTS, C. (2004): American Mineralogist, 89, 1826-1834.