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Calcic tourmalines from eastern part of metamorphic envelope of the Karkonosze Granite Massif (NE part of Moldanubian Zone, Lower Silesia, Poland)

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The crystallochemical evolution of tourmalines from a quartz vein cutting an amphibolitic insert within mica schists in the eastern part of metamorphic envelope of the Karkonosze Granite massif close to the Kowary town in Lower Silesia, Poland (NE part of Moldanubian) was studied in detail. The amphibolite was formed from a mixed magmatic-sedimentary protoliths (connected with pre-Variscian bimodal volcanism products like basic lavas and basic tuffs), which underwent regional Variscan metamorphism under MP-MT conditions, and then were modified by contact metamorphism induced by the intrusion of the Karkonosze Granite pluton [1].

The primary tourmaline occurs as multi-zoned crystals of alkali group (^{X}Na+K $>$ ^{X}Ca $>$ $\square^{X}$) with varying relationship between ^{W}OH and ^{W}O, corresponding respectively to Mg-bearing schorl or oxy-schorl. It evolves to a calcic tourmaline (^{X}Ca $>$ ^{X}Na+K $>$ $\square^{X}$), probably with predominance of ^{W}O over ^{W}OH (fluorine is absent in both tourmaline types) of uvite type. The octahedral occupants are dominated by Al, Mg and Fe^{2+} in both tourmaline types, although Al is not sufficient to fill the Z site completely ($5.5 < Al < 6$ apfu). As in tourmalines of uvite type Al deficiency is commonly completed by Mg, we consider, at the lack of structure data, that in our tourmalines the Y sites are dominantly occupied by Fe^{2+}. As a result, the main Y, Z and W-site occupants suggest that the calcic tourmaline could correspond to oxy-feruvite species unknown to date. The Mg/Mg+Fe ratio reaches the values from 0.64 in the schorl-type tourmaline to 0.48 in the uvitic tourmaline. The increased TiO_2 amount locally reaches up to 1.58 wt.%, although it is without any accordance in relation to the first or second tourmaline type.

The main trend of chemical evolution of the tourmalines during the prograde metamorphism is highly connected with amphibolite as their host rock. The increasing role of Ca, Ti and Fe, resulting in the formation of feruvite to possible oxy-feruvite, is probably related to progressive decomposition of plagioclases and associated Ti oxides (ilmenite, rutile) from the host amphibolite during the regional Variscan metamorphism. (Mochnacka *et al.*, 2008). It seems that the formation of the quartz vein containing the tourmalines is connected with increasing of temperature and fluid activity, the latter, perhaps, released during the contact metamorphism event conducted by Karkonosze Granite intrusion.

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References:

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[2]Oberc-Dziedzic, T., Kryza, R., Mochnacki, K. and Larionov, A. 2010. Ordovician passivecontinental margin magmatism in the Central-European Variscides: U–Pb zircon datafrom the SE part of the Karkonosze-Izera Massif, Sudetes, SW Poland. *International Journal of EartSciences* (*Geologishe Rundschau*) **99**, 27–46.