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ORIGIN OF TOURMALINES FROM THE WESTERN TATRA MOUNTAINS, POLAND

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Black tourmalines, with composition of schorl–dravite, are present in vein and lens-like pegmatites of the Western Tatra Mts. (8–21 v% of tourmaline) and occasionally form the tourmalinite nests (~ 60 % vol.) coexisting with quartz, albite and microcline. They cut both metapelitic rocks and leucogranite intrusions. Unit cell parameters of tourmalines are: a_0 = 15.96 Å, c_0 = 7.18 Å. The zonation of individual crystals is poor, expressed in Z and Y cations substitution. Mössbauer spectra show the variable oxidation degree of Fe.

The field observations and geochemical data are consistent, showing the affinity of tourmalines to both metasedimentary Ca poor host rocks, saturated in Al, and anatectic, syn-collisional leucogranites, lacking magmatic Fe-Mg minerals. Comparing the p–T maximum conditions of anatexis (700–720 °C, 7.5–10 kbar; GAWĘDA & KOZŁOWSKI, 1998), the mobilisation of (Mg, Fe) to melt/fluid phase could occur only when melting started in lower temperatures than in other parts of the complex. That process was catalysed by the presence of boron in the metamorphic fluid, lowering the melting point of so-called minimum granite composition. Such situations were very restricted, taking into account the water-undersaturated conditions of melting and the typical fluid composition: CH_4-CO_2-N_2-H_2O (JANAK *et al.*, 1996, GAWĘDA *et al.*, 1996).

The enhanced admixture of buergerite-type suirnituflon in some tourmaline samples is interpreted as the result of re-heating to a temperature over 400 °C (possibly 600–650 °C) by the Main Tatra Granite intrusion. The multistage Main Tatra Granite is connected to the extensional stage of the Tatra crystalline basement development, which followed the compression (collision and nappe staking) stage which formed the anatectic melt and tourmaline forming fluid phase.

References

GAWĘDA, A., PIECZKA, A. & ŻABIŃSKI, W. (1996). Miner. Pol., 27: 83–90.
GAWĘDA, A. & KOZŁOWSKI, K. (1998). CBGA XVIth Congress, Vienna, Abstracts: 177.
JANAK, M., O'BRIEN, P.J., HURAI, V. & REUTEL, C. (1996). Lithos, 39: 57–79.