SCANDIUM AND REE-RICH TOURMALINE FROM THE KRACOVICE PEGMATITE (BOHEMIAN MASSIF) AND ITS BREAKDOWN TO ALLANITE

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Kracovice pegmatite dyke (mixed NYF+LCT signature) cuts graphitic gneiss ~300 m W fro the edge of the Třebíč Pluton (Moldanubian zone, Czech Republic). From contact inwarc the pegmatite consists of: a coarse-grained granitic unit (Kfs+Pl+Qtz+Bt+Ms+Tnt), abundant graphic unit (Kfs+Qtz±Bt) evolving to minor blocky K-feldspar and albite compl situated close to a small quartz core. Minor to accessory tourmaline occurs in graphic, bloc K-feldspar and albite units. Other minor to accessory minerals include Y,Sc-enrich spessartine, topaz, Li-micas, beryl, cassiterite, zircon, allanite-(Ce), Nb-rutile, columbit fergusonite-, samarskite- group minerals, *wolframoixiolite*, F-rich hambergite, monazite-(C and xenotime-(Y).

Magmatic tourmaline forms typically black columnar crystals (≤ 6 cm long), wi composition corresponding to Al-rich schorl (6.92–7.37 apfu Al; 1.96–2.24 apfu Fe; 0.0 0.08 apfu Mg; $Fe_{tot}/(Fe_{tot}+Mg)$ ~0.98; 0.19–0.55 apfu F; X-site vacancy 0.28–0.44 pfu), usually overgrown and/or partly to almost fully replaced by later green magmati hydrothermal fluor-elbaite (1.4–2.5 wt. % Li_2O; high Al 6.96–7.32 apfu; variable Fe 0.3 1.45 apfu; high Mn 0.07–0.57 apfu, $Fe_{tot}/(Fe_{tot}+Mg)$ ~0.99; very high Na 0.83–0.99 apfu in X site; high F 0.87-1.05 apfu). The magmatic Al-rich schorl shows high and variable Sc (42-3 ppm) and Y+REE (17–458 ppm) contents with steep LREE-enriched REE pattern (La_N/G ratio 10–29). Scandium and Y+REE contents in magmatic Al-rich schorl systematical decrease during tourmaline crystallization reflecting depletion of the melt in Sc,Y,REE progressive crystallization and coeval crystallization of Y,REE(±Sc)-rich phases. Lat magmatic-hydrothermal fluor-elbaite is significantly depleted in Sc (18-61 ppm) and Y+RE (4–31 ppm) with flatter REE pattern (La_N/Gd_N ratio 3–12). Both tourmaline generations sh deep negative Eu anomaly (Eu/Eu* <0.05).

Sc,REE-rich central parts of magmatic Al-rich schorl are commonly partly altered a replaced by chlorite and allanite-(Ce). The allanite-(Ce) occurs exclusively in Al-rich scho in samples where Al-rich schorl is rimmed and partly replaced by fluor-elbaite. The allanit (Ce) has very steep LREE rich chondrite normalized REE pattern with significant negative E anomalies (Eu contents <1 ppm) and shows unusually high Sc content (≤3.3 wt. % Sc_2O_3) well as Sn enrichment (≤1.0 wt. % SnO_2). The replacement is resulted by interaction betwe Al-rich schorl and the Li- and F-rich pegmatite-derived fluids. REE and Sc required f formation of Sc-rich allanite probably released from dissolved REE and Sc enrich magmatic Al-rich schorl.

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