Tourmalines of the Metabasite Zone, Brno Batholith

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Several localities of hydrothermal tourmaline were formed in the western part of the metabasite zone (metadiorite subzone) of the Brno batholith (Novák et al., 1997). They lie mostly in the central and southern part of this zone, which is built of various coarse- to medium-grained hornblende to hornblende–biotite metadiorites, less common gabbros, serpentinites and amphibolites, metamorphosed in greenschist facies and subsequently hydrothermally altered (Hanžl and Melichar, 1997; Leichmann and Höck, 1997). These rocks are often cut by dykes of leucocratic granite, aplite and rhyolite (some of them containing accessory tourmaline).

Hydrothermal, black tourmaline of the schorl-dravite composition exhibits a wide range of Al content and very low F (0.01–0.06 apfu).

Four distinct paragenetic occurrences of tourmaline were distinguished:

(i) Tourmaline in rhyolites forms either small grains concentrated in layers 1–3 mm thick or euhedral grains occurring together with chlorite X_{Fe}(0.81–0.83), in pseudomorphs after unidentified mafic mineral. Tourmaline is Mg-rich schorl (X_{Fe} 0.64–0.71). Al exceeds to the Y-site (0.21–0.49 apfu of ^{Y}Al), the Z-site is fully occupied by Al. Sodium predominates (0.63–0.81 apfu), whereas Ca is minor (0.04–0.09 apfu) in the X-site.

(ii) Quartz-tourmaline veins cutting diorites and granites in the metabasite zone. These veins (quartz+tourmaline±calcite, chalcopyrite, rutile), ranging from 1 to 20 cm in thickness, strike generally NNE–SSW direction, following shear planes. Tourmaline forms fine-grained fibrous aggregates along contacts with the host rock; carbonates are common associated minerals. Fe-rich dravite, sporadically X-site vacant, shows a relatively constant XFe ratio (0.31–0.44) and low Ca content (0.05–0.17 apfu), but wide variation in Al and Na (5.82–6.75 and 0.48–0.87 apfu, respectively).

(iii) Tourmaline veins and accumulations in altered aplites are represented by coarse radial aggregates, up to 10 cm large. Fe-rich dravite (oxy-dravite) has low Al (5.32–5.98 apfu) and high Na content (0.74–0.86 apfu).

(iv) Tourmalines from amphibolites fill small ruptures, occasionally with accessory calcite and chalcopyrite. This tourmaline corresponds to Fe-rich dravite to schorl-dravite (X_{Fe} = 0.31–0.49) with low content of Al (5.36–5.94 apfu). Na (0.53–0.62 apfu) but high content of Ca (0.26–0.37 apfu) in the X-site are typical for tourmaline from these mafic rocks.

The examined tourmaline samples exhibit a relatively broad range of composition from Mg-rich schorl in rhyolites to Fe-rich dravite to X-site vacant, Fe-rich dravite in hydrothermal veins. The occurrences of hydrothermal tourmaline in metadiorite subzone and axinite veins at Lažany (Novák and Filip, 2002) indicate higher activity of hydrothermal fluids rich in B and poor in F along western border of the metabasite zone in late stages of complex evolution of the Brno batholith. These fluids were very likely derived from granitic rocks adjacent to the western border of the metabasite zone and/or rhyolites occurring within the metabasite zone. Mineral assemblages and textures suggest relatively low-temperature hydrothermal origin and high activity of CO_2 in fluids.

Acknowledgements

This research was supported by the FRVŠ of the Czech Republic, Grant No. 579/2003, and CEZ: J07/98: 143100003 to MN.

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