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Erratum

70. annual meeting of the Swiss Society of Mineralogy and Petrology at St. Gallen

September 6, 1995

Abstracts of communications

Schweiz. Mineral. Petrogr. Mitt. 76/1, 97–123, 1996

p. 102–103. *Replace by complete text:*

R. Gieré, D. Rumble and C. Todd (Basel, Washington, Bern):

Metamorphism of tourmaline-rich metapelites at Campolungo (Leptontine Alps, Switzerland).

Large tourmaline crystals occurring in metapelites at Campolungo (Penninic Central Alps; Swiss Coordinates: 698.500/146.650) exhibit an optically visible three-stage zoning (core, inner rim, outer rim). These zones are separated by two distinct discontinuities: the first outlines a euhedral core, whereas the second (between inner and outer rim) is sutured and represents a corrosion event before the final growth. Element distribution maps and electron microprobe analyses document a continuous chemical zoning superimposed onto both inner and outer rim. The corrosion surface, formed during or after a period of deformation, truncates the continuous zoning of the inner rim, and exhibits a very pronounced chemical gradient (outer rim markedly richer in Mg and Na, but poorer in Al, Fe, Ca). Moreover, the optical and chemical investigations revealed that the oldest growth zones of the tourmalines, i.e. their cores, contain needle-shaped inclusions of distinctly different composition, possibly representing exsolution lamellae.

In order to determine the oxygen isotopic composition of individual growth zones in tourmaline, we extracted oxygen gas (by laser-fluorination) from separates of each zone. So far, we have one complete data set for a single crystal: the $\delta^{18}\text{O}_{\text{SMOW}}$ values (in ‰) are 5.1 (core), 5.2 (inner rim) and 5.5 (outer rim). In combination with partial data sets for other crystals, average values of 5.2 ± 0.1 , 5.4 ± 0.4 and 6.0 ± 0.1 were obtained for core, inner rim and outer rim, respectively. These data underline the importance of the corrosion event, after which tourmaline grew at different conditions.

Preliminary thermobarometric calculations using the assemblage garnet + biotite + mus-

covite + quartz + kyanite + ilmenite + rutile in the metapelite yield a well-defined P-T estimate at 643 ± 11 °C and 7.5 ± 0.4 kbars, interpreted as peak metamorphic conditions (P at T_{max}). Furthermore, dehydration reactions involving staurolite indicate a relatively low water activity in the fluid ($a_{\text{H}_2\text{O}} = 0.7 \pm 0.1$), which could be explained by infiltration of CO_2 -rich fluids from nearby metacarbonate rocks. These fluids are possibly responsible for the isotopic zoning in tourmaline as well.

The temperature estimated from the phase assemblage is consistent with the oxygen isotope equilibration temperatures of biotite and quartz (631 °C) and muscovite and quartz (624 °C; calculated from the fractionation data of RICHTER and HOERNES, 1988). Moreover, these temperatures agree fairly well with the oxygen isotope equilibration temperature of tourmaline and quartz (600 °C; outer rim of tourmaline) obtained by using the empirical geothermometer of KOTZER et al. (1993).

Similar tourmaline-rich rocks occur also at various other localities in the Lepontine Alps; they appear to be confined to a stratigraphic position just below or within the first marine sedimentary rocks which were deposited during transgression of the Tethys ocean in the late Permian or early Triassic period. These rocks, therefore, may provide paleogeographic information for the Penninic realm at the end of the Paleozoic; moreover, they are well suited to give further insight into the metamorphic and structural evolution of the Lepontine Alps.

KOTZER, T.G., KYSER, T.K., KING, R.W. and KERRICH, R. (1993): An empirical oxygen- and hydrogen-isotope geothermometer for quartz-tourmaline and tourmaline-water. *Geochim. Cosmochim. Acta.* 57, 3421–3426.

RICHTER, R. and HOERNES, S. (1988): The application of the increment method in comparison with experimentally derived and calculated O-isotope fractionations. *Chem. Erde* 48, 1–18.