Epidote populations in contaminated granitic pegmatites from Northern Portugal

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In Domo de Covas mega-anticline (Serra de Arga, N Portugal) the digestion of metacarbonate host-rocks during pegmatitic intrusion produced Ca saturation and high silica impoverishment, resulting desilicated pegmatite veins with plagioclase, scapolite, and local concentrations of phosphate and epidote.

The following vein-fillings are distinguished:

1. *Hybrid pegmatoids* (π1): include plagioclase (mainly anorthite) ± quartz ± triphylite – lithiophilite. Fluorapatite occurs in border units and mark the transition to π2 veins. Vesuvianite is discordant in exo-contact metasomatic hosts.

2. *Hybrid and fractionated pegmatoids* (π2): occur laterally and are the products of fractionation of π1 pegmatites. They consist mainly of prehnite + pink clinozoisite. The clinozoisite is larger where it has crystallized first and these crystals manifest progressive zoning (Fig. 1). Textures also indicate simultaneous crystallization of zoisite and prehnite. Some latest veins only have prehnite (π2-2).

Oligoclase neosome, with scapolite and epidote, bearing sulphide cavities (chalcopyrite and sphalerite) fall into a more typical primary tendency, directed towards the albite pole in the haplogranite system.

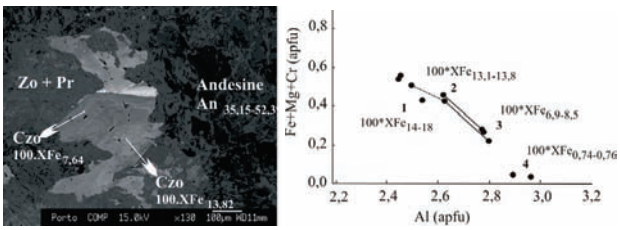

Fig. 1: Mineral intergrowth from veins (π2) – subhedral corroded crystal of clinoizoisite (Czo) in transition to sympletitic zoisite (Zo) and prehnite (Pr) - and compositional fields of epidote from π2 veins.

Epidote and prehnite would come from the earlier crystallization of melts, which composition was modified by desilication. Low Fe content of zoisite (maximum XFe calculated content, 0.76) indicates low P, T conditions. The minimum temperature of crystallization is 440-500ºC (P <5Kbar), deduced from zoisite and clinozoisite compositions, in coexisting crystals, according to [1].

The lowest temperature is accompanied by a zoisite – plagioclase transition, consistent with the final reaction: 3 anorthite + 2 calcite ⇔ 2 zoisite + CO_2. Plagioclase may result from the reaction CO_2 + 2 clinozoisite ⇔ 3 anorthite + calcite + H_2O.

The contamination of Li-rich residual magma by Fe and Mn transfer, gives rise to the emergence of triphylite-lithiophilite concentrations that under normal conditions would not occur. Contamination is also expressed by high Zn concentrations in zircon (maximum content observed, 1.52%) and the deposition of sulphides in oligoclase pegmatoids. The protolith contains exhalite with high contents of Zn and Mn that were remobilized by the intrusion of pegmatite magmas.

[1] Franz, G. & Selverstone, J. (1992) *Am Mineral*., **77**, 631-642.