

Proto-polymorphs of jimthompsonite and chesterite in contact-metamorphosed serpentinites from Japan

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ABSTRACT

Proto-polymorphs of jimthompsonite and chesterite occur in metamorphosed serpentinites from two Japanese ultramafic complexes. The lattice constants of the proto triple-chain silicate, measured by X-ray diffraction, are $a = 0.93605(208)$, $b = 2.72560(588)$, and $c = 0.53160(89)$ nm, whereas those of the mixed double- and triple-chain silicate are $a = 0.94202(78)$, $b = 4.54402(392)$, $c = 0.53440(45)$ nm, and $\beta = 90.026(18)^\circ$. The lattice constants and systematic extinctions revealed by selected-area diffraction patterns are consistent with proto-triple-chain silicate ($Pbcn$) and mixed double- and triple-chain silicate ($A2/m, Am$), but not with the ortho- and clino-polymorphs. High-resolution transmission electron microscopy [016] images of the triple-chain silicate and [0 1 15] images of the mixed-chain silicate indicate they have a (X) configuration. Proto forms of wide-chain pyriboles might be geologically widespread.

Keywords: Protopyribole, jimthompsonite, chesterite, protoanthophyllite, biopyriboles, serpentinite, HRTEM, Hayachine