

LETTER

High-pressure synthesis of $\text{Na}_2\text{Mg}_6\text{Si}_6\text{O}_{18}(\text{OH})_2$ —a new hydrous silicate phase isostructural with aenigmatite

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ABSTRACT

A new hydrous phase, $\text{Na}_2\text{Mg}_6\text{Si}_6\text{O}_{18}(\text{OH})_2$, which is isostructural with aenigmatite, was synthesized at 10 GPa and 1250 °C and its structure studied with X-ray diffraction data collected from a twinned crystal on a CCD diffractometer. The unit-cell parameters are $a = 10.2925(9)$, $b = 10.7052(9)$, $c = 8.8027(10)$ Å, $\alpha = 105.280(2)$, $\beta = 96.712(2)$, $\gamma = 125.256(2)^\circ$, and $V = 718.1(5)$ Å³. The structure refinement indicates that O4 and O14, the only 2 O atoms that are not bonded to Si, are protonated. The presence of OH in the structure is confirmed by an unpolarized Raman spectrum. Compared to anhydrous sodic phases with the aenigmatite-type structure, silicate chains in hydrous $\text{Na}_2\text{Mg}_6\text{Si}_6\text{O}_{18}(\text{OH})_2$ are more kinked, resulting in relatively long average Na-O distances.