
Cooling Rate Dependency of the Formation of Smectite Crystals from a High-Pressure and High-Temperature Hydrous Melt

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Abstract: The effect of cooling rate on the formation of smectite crystals with high crystallinity was investigated using two different types of high-pressure and high-temperature apparatus, a modified belt type and a uniaxial split-sphere type. The cooling rate was changed after a treatment of the sample at 5.5 GPa and 1500° C. Smectite crystals were obtained at faster cooling rate, coexisting with coesite, kyanite, jadeite, corundum and/or glass. In the slowly cooled process, no smectite crystals were obtained but coesite, kyanite, jadeite and clinoenstatite were formed. These results indicate that smectite crystals are formed metastably during the quenching of the high-pressure and high-temperature hydrous silicate melt.

Key Words: High pressure experiment • Quenching rate • Smectite crystals

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