

Effects of water on cation diffusion in wadsleyite

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Wadsleyite is a major constituent mineral in the mantle transition zone. It is important for understanding the nature of the mantle transition zone to examine the physical properties of wadsleyite. In this study, we examined Fe-Mg interdiffusion rates in wadsleyite under hydrous conditions.

Using two kinds of hydrous wadsleyite with different Mg#(0.9 and 1.0) as the starting materials, high pressure experiments were conducted at 15-16GPa and 1273-1473K to determine cation diffusion rates in hydrous wadsleyite. Fe-Mg interdiffusion rates of hydrous wadsleyite were enhanced by more than one order of magnitude compared to those of anhydrous wadsleyite.

These results imply that viscosity of mantle transition zone might decrease, if H₂O is transported to the mantle transition zone.