

## Effect of pressure on water solubility in aluminous bridgmanite

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We have conducted a sequence of high pressure experiments to study water solubility in aluminous bridgmanite as a function of pressure at 1900°C. The experimental high pressures were generated using multi-anvil presses at Bayerisches Geoinstitut (BGI) for pressures up to 28 GPa and at Geodynamics Research Center (GRC) for pressures above 30GPa. The starting material for these experiments was a mixture of oxides ( $Mg(OH)_2$ ,  $Al_2O_3$  and  $SiO_2$ ) with equivalent of about 5 mol % of  $Al_2O_3$  and 15 wt % of  $H_2O$ . The structure and composition of the bridgmanite sample after high P/T syntheses were examined using x-ray diffraction (XRD) and electron probe microanalysis (EPMA). Water concentration in the sample was measured using secondary ion mass spectroscopy (SIMS) and Fourier transform infrared spectroscopy (FTIR). The measurements yield that the aluminous bridgmanite with about 2 wt% of  $Al_2O_3$  may take as much as 0.13 wt % of  $H_2O$  at the P/T condition of the top of the Earth's lower mantle and this solubility increases significantly with pressure. At the bottom of Earth's lower mantle, bridgmanite may take nearly a couple of weight percent of water according to simple extrapolation of the experiment result, indicating that the capacity of water reservoir of the lower mantle can be as large as a few to ten oceans of water.