

Viscosity of CO₂-bearing sodium aluminosilicate melt at high pressure

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Viscosity is one of the important transport properties controlling the migration of magma in the Earth's interior. Experimental and geochemical studies showed that magma in the deep interior was generated in the presence of CO₂. However, our knowledge on the effect of CO₂ on the viscosity of magma (silicate melt) is still insufficient. Here we report the viscosity of sodium aluminosilicate melt with jadeite composition containing 0.5 wt% of CO₂ under high pressure. Viscosity was measured by the falling sphere method by using X-ray radiography image. Experiments were carried out using the MAX-III apparatus installed at the station NE7A of PF-AR synchrotron radiation facility in KEK (High Energy Accelerator Research Organization), Tsukuba, Japan. Viscosity was calculated using the Stokes equation with the correction of wall effect. Viscosity measurements were carried out up to 2.4 GPa. We observed that viscosity of the CO₂-bearing melt was one order of magnitude lower than those of CO₂-free jadeite melt. The temperature dependence of the melt is similar to that of the CO₂-free jadeite melt.

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