

Viscosity of KAlSi_3O_8 melt under high pressure

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Viscosity is a fundamental property controlling the transportation of magma in the planetary interiors. In this study, we measured the viscosity of KAlSi_3O_8 composition of melt under high pressure. The viscosity was measured by the falling sphere method using an X-ray radiography system. Experiments were performed at the NE7A station of the PF-AR synchrotron radiation facility in KEK, Tsukuba, Japan. High pressure was generated using a Kawai-type apparatus driven by a DIA-type guide block in the MAX-III press. A powder of natural sanidine (KAlSi_3O_8) was loaded with a platinum sphere in a molybdenum container. Powder X-ray diffraction data were obtained by energy-dispersive method using a pure Ge solid state detector. Pressures were determined by using an equation of state of MgO. The results show that the viscosity of KAlSi_3O_8 melt decreased with increasing pressure up to 6 GPa.

Keywords: magma, viscosity, high pressure, mantle, synchrotron radiation