# Viscosity of albite melt at high pressure

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We have calibrated the pressure-modified Avramov-Senkov-and Miracle (ASM) viscosity model for albite liquid up to 7 GPa and 2000 K. Essential for this model of viscosity ($\eta$) are constraints on the pressure dependence of the glass transition temperature [$T_g$ = f(P)] and the temperature dependence of viscosity in the limit of $T_g$ – known as the fragility index ($m$). We have determined $T_g$ at high pressure by tracking the progress of densification during high-temperature annealing for run durations of ~five (5) times the characteristic timescale for structural relaxation. $T_g$ decreases by ~53 K/GPa to 2.6 GPa, and thereafter shows a weakly negative pressure dependence approaching zero. We combine these constraints with $T_g$ and $m$ at 1 atm, and use high-pressure, high-temperature viscosity data to quantify the magnitude of $m$ as a function of P. The fragility index $m$ remains within uncertainty of the 1 atm value to ~2.6 GPa and increases exponentially from 2.6 to 7 GPa. Our treatment provides a continuous description of the viscosity of albite liquid from the glass transition temperature to ~2000 K and up to 7 GPa, in which the viscosity of albite liquid at low temperature approaches a plateau value (mirroring the change in $T_g$ with pressure), while viscosity at high temperature continues to decrease steeply up to ~7 GPa, without a change in the sign (negative to positive) of the pressure dependence. Recognizing this temperature dependence on pressure dependence of viscosity helps to reconcile the difference in experimental viscosity measurements and predictions from MD simulations performed at considerable higher temperatures. The success of ASM model applied to albite liquid supports broader applicability to naturally occurring silicate liquids – however, success will require new experimental constraints on the glass transition at high pressure.