

**THE VISCOSITY OF DACITIC LIQUIDS MEASURED AT
CONDITIONS RELEVANT TO EXPLOSIVE ARC VOLCANISM:
DETERMINING THE INFLUENCE OF TEMPERATURE, SILICATE
COMPOSITION, AND DISSOLVED VOLATILE CONTENT**

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ABSTRACT

Viscosity can control various magmatic processes and varies by orders of magnitude as a function of temperature, composition and dissolved volatiles. There is no predictive model for the viscosity of dacitic liquids, which are involved in explosive volcanism. This study investigated the effects of variable composition and water content on dacitic liquids.

Ten dacitic glasses were synthesized with varying degrees of polymerization. Hydrous glasses were made with water contents varying up to 5 wt.%. The viscosity was measured using parallel plate and concentric cylinder viscometry. TVF equations, of the form $\log \eta = A + B/(T-C)$, allow prediction of hydrous liquid viscosities at magmatic temperatures.

At 1100K, liquids containing 1 and 5 wt.% dissolved water are about 5 and 7 orders of magnitude less viscous than anhydrous liquids, respectively. The results demonstrate that varying polymerization state of the liquids has a smaller effect on viscosity than water content and temperature.