

The speciation of dissolved H₂O in dacitic melt

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ABSTRACT

We report the first systematic study of H₂O speciation in dacitic melt with total dissolved H₂O ranging from 1.4 to 2.6 wt%. Samples were heated in a one-atmosphere tube furnace at 480–590 °C for certain durations and then quenched in water or air. Species concentrations were measured with Fourier transform infrared (FTIR) spectroscopy. At a given temperature, the equilibrium constant for the reaction, H₂O_m (melt) + O (melt) = 2OH (melt), is roughly constant. At the same temperature and water content, the equilibrium constant for the hydrous species interconversion reaction in dacitic melt appears to be slightly greater than in hydrous rhyolitic melt, reflecting a larger proportion of dissolved H₂O as hydroxyl groups in dacitic melt. Our results can be applied to model species equilibrium in hydrous dacitic melt, to estimate the apparent equilibrium temperature of natural dacitic glasses, and to investigate viscosity of hydrous dacitic melts.