American Mineralogist, Volume 88, pages 1390–1394, 2003

High-temperature limits on viscosity of non-Arrhenian silicate melts

J.K. RUSSELL,[1,*] D. GIORDANO,[2] AND D.B. DINGWELL[2]

[1]Department of Earth and Ocean Sciences, The University of British Columbia, Vancouver, B.C., V6T 1Z4
[2]Institut fur Mineralogie, Petrologie und Geochemie, Ludwig Maximilians Universitat Muenchen, Muenchen, Germany D80333

ABSTRACT

The prediction of viscosity in silicate melts, over the range of conditions found in nature, remains one of the most challenging and elusive goals in Earth Sciences. We present a strategy for fitting non-Arrhenian models [e.g., Vogel-Tammann-Fulcher (VTF) or Adam-Gibbs (AG)] to viscosity data that can be employed toward a full multicomponent model for melt viscosity. Our postulate is that the high-*T* viscosities of silicate melts converge to a common value. The implications are twofold. First, the number of composition-dependent parameters is reduced by a third. Second, our optimization constrains the experimentally inaccessible, high-*T* properties of silicate melts. The high-*T* limits to melt viscosity are constrained by the VTF and AG models to between $10^{-4.3\pm0.74}$ and $10^{-3.2\pm0.66}$ Pa·s, respectively, and overlap in the interval $10^{-3.86}$ to $10^{-3.56}$ Pa·s.