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Viscosity of Glass-Forming Liquids

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The low temperature dynamics of ultraviscous liquids hold the key to understanding the nature of glass transition and relaxation phenomena, including the potential existence of an ideal thermodynamic glass transition. Unfortunately, existing viscosity models such as the Vogel-Fulcher-Tammann (VFT) and Avramov-Milchev (AM) equations exhibit systematic error when extrapolating to low temperatures, despite their relative success at higher temperatures. We present a model offering an improved description of the viscosity-temperature relationship for both inorganic and organic liquids, using the same number of parameters as VFT and AM. The new model has a clear physical foundation based on the temperature dependence of configurational entropy, and it offers accurate prediction of low temperature isokoms without any singularity at finite temperature. Our results cast doubt on the existence of a Kauzmann entropy catastrophe and associated ideal glass transition.