Static and Dynamic Heterogeneities in Tetrahedral Liquids

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The thermodynamic behavior of water and other tetrahedral liquids such as silicon, silica, and carbon seems to be closely related to static heterogeneities. These static heterogeneities are related to the local structure of clusters of neighboring molecules and, when properly characterized, may offer an economical explanation of thermodynamic data. “What matters” most in determining some of the unusual properties of tetrahedral liquids may be the fact that the local geometry of molecules and their neighbors is not spherical or oblong, but rather tetrahedral. With respect to static heterogeneities, this local geometry is critical. The dynamic behavior of tetrahedral liquids seems to be closely related to dynamic heterogeneities, which seem to explain the dynamics of supercooled liquid water remarkably well.


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