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Mixing Rules for Optical and Transport Properties of Warm, Dense Matter JOEL KRESS, DANIEL HORNER, LEE COLLINS, Theoretical Division, Los Alamos National Laboratory, Los Alamos, 87545 NM — Warm, dense matter (WDM) is a regime that requires sophisticated treatment; it is not well described by ideal gas laws or plasma models. A myriad of physical systems fall under the WDM umbrella, from the element ratios in large gas planets and the cooling of white dwarf stars to energy transfer in inertial confinement fusion plasmas and materials under shock compression. Mixtures represent the predominant form of matter throughout the universe and the ability to predict the properties of a mixture, through direct simulation or from convolution of the properties of the constituents is both a challenging prospect and an important goal. Through quantum molecular dynamics (QMD), we can accurately simulate WDM and compute equation of state, transport, and optical properties of such materials, including mixtures, in a self-consistent way from a single simulation. With the ability to directly compute the full mixture properties, we are able to validate mixing rules for combining the optical and dynamical properties of Li and H separately to predict the properties of lithium hydride (LiH). We have looked at two such mixing rules and extend them to morphologies beyond a simple liquid alloy. We have also studied shock compressed methane and polyethylene, where we have looked at the effect of impurities.

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