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Improving the Model Fidelity for the Mechanical Response in a Thermal Cookoff of HMX[1] ALBERT NICHOLS, Lawrence Livermore National Laboratory — Understanding the response of energetic materials to adverse thermal environments is necessary to have confidence in the safety those systems. In the past few years we have been improving our thermal-mechanical-chemical modeling of HMX-VitonA based systems. Time to event predictions are very good, to within a degree of the experimental result. However, the chemical network/reaction rates are under constrained, and many networks can achieve the same level of accuracy. Recently, we have significantly improved the mechanical response modeling by the inclusion of porosity and surface tension in the solid species in the reaction network. We discuss the addition of the reversible sublimation/vaporization reactions to the reaction network. This reaction provides a non-reactive pathway yielding mass loss in the lower temperature region in TGA experiments. This implies that a lower decomposition rate can achieve the same overall level of mass loss, thus reducing the gas pressurization in the models of experiments like the Scaled Thermal Explosion eXperiemt.

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