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Measuring and Modeling Liquidus Temperature in High-level Nuclear Waste Glasses JONATHAN HANNI, Washington State University, Pullman, WA 99163, ERIC PRESSLY, KEVIN MINISTER, JARROD CRUM, JOHN VIENNA, Pacific Northwest National Laboratory, Richland, WA 99354, THEODORE BESMANN, Oak Ridge National Laboratory, Oak Ridge, TN 37831, KARL SPEAR, Pennsylvania State University, College Park, PA 16802 — The U.S. Department of Energy (DOE) is currently constructing the world's largest vitrification facility at the Hanford Nuclear Reservation in Richland, Washington. The goal of this facility is to reduce current environmental threats caused by liquid nuclear wastes by melting them into stable oxide glasses. Glass compositions must be chosen which will optimize durability and waste loading. Crystallization is one of the main limiting conditions for both durability and waste loading. Liquidus temperature (T_L), defined as the temperature below which the melt will begin precipitating crystalline phases, can be used to determine optimum melting conditions and glass compositions. Currently, a modified associate species model (ASM) has been developed to predict T_L and primary phase as a function of melt composition. In this work, model predictions are compared with measured data for 42 different melt compositions within the Al_2O_3-B_2O_3-CaO-Na_2O-SiO_2 chemical network. Data have also been measured for glass melts that include 7 additional oxides common to Hanford waste. These will be used as benchmarks for comparison as the ASM is expanded.

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