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Utilization of Relaxation Calorimetry to Examine the Thermal Properties of $Pr_{1-x}Nd_xOs_4Sb_{12}$[1] MATTHEW BROWN, YEH-CHIA CHANG, PEI-CHUN HO, Dept. of Physics, California State Univ., Fresno, M. BRIAN MAPLE, Dept. of Physics, Univ. of CA, San Diego, TATSUYA YANAGISAWA, Dept. of Physics, Hokkaido Univ., Japan — Compounds of the form MT_4X_{12}, known as filled skutterudites, where M is a rare earth metal, T is a transition metal, and X is a pnictogen exhibit extremely unique electronic and magnetic properties at low temperatures. For example, $PrOs_4Sb_{12}$ and $NdOs_4Sb_{12}$ exhibit unconventional superconductivity(SC) and low-temperature ferromagnetism(FM), respectively. The doped samples of $Pr_{1-x}Nd_xOs_4Sb_{12}$ have competing effects of SC and FM that vary as a function of x, the Nd concentration. The specific heat of $Pr_{1-x}Nd_xOs_4Sb_{12}$ in the range from 11K–300K was measured using relaxation calorimetry. The resulting specific heat data is curve fitted using the Debye, Einstein, and Sommerfeld models. The Debye and Einstein Temperature, the electronic specific heat coefficient, and the relative contributions from the Debye and Einstein models are extracted. These properties yield insight from the compound; the Debye Temperature, the Einstein Temperature, and the electronic specific heat coefficient describe the stiffness of the crystal structure, the rattling effect of the rare earth metals, and the correlation between electrons, respectively. The ultimate result is to determine the dependency of these thermal properties on x.

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