

High-temperature heat capacity of grossular ($\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$), enstatite (MgSiO_3), and titanite (CaTiSiO_5)

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ABSTRACT

The heat capacities of synthetic grossular ($\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$), ortho- and protoenstatite (MgSiO_3), and titanite (CaTiSiO_5) were determined from drop-calorimetry measurements made between 400 K and 1390, 1811, and 1809 K, respectively. The heat capacity of grossular increases smoothly with temperature before leveling off in an anomalous way above 1500 K. For enstatite, no large heat capacity difference seems to occur between the ortho- and protoenstatite forms although important premelting effects are observed for protoenstatite above 1700 K. Our results for titanite up to the melting point confirm the minimal calorimetric effects at the para-antiferroelectric transition near 500 K and the large magnitude of the premelting enthalpy, which represents about 25% of the reported enthalpy of fusion.