

## Low-temperature heat capacity of pentlandite

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### ABSTRACT

The heat capacity of synthetic pentlandite  $\text{Fe}_{4.60}\text{Ni}_{4.54}\text{S}_8$  was measured over the temperature range 6–306 K. Experimental values of  $C_p(T)$  indicate that there are no phase transitions. The thermodynamic functions  $C_p(T)$ ,  $H(T) - H(0)$ , and  $S(T) - S(0)$  were evaluated:  $C_p(298.15) = 442.7 \text{ J/mol}\cdot\text{K}$ ,  $S(298.15) - S(0) = 474.9 \text{ J/mol}\cdot\text{K}$ , and  $H(298.15) - H(0) = 76280 \text{ J/mol}$  (molar mass: 779.877 g). Below 10 K, the heat capacity of pentlandite fits the regression  $C_p(T) = aT + bT^5$ . The linear term is typical of metals and known as an electronic contribution to the heat capacity. This agrees with the hypothesis that there is metal bonding among cations in tetrahedral sites.