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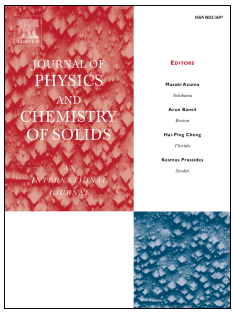

Equation of state, thermoelastic properties and melting behavior of NaCl at high temperatures and high pressures

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PII: S0022-3697(18)30330-5

DOI: 10.1016/j.jpcs.2018.08.027

Reference: PCS 8703

To appear in: *Journal of Physics and Chemistry of Solids*

Received Date: 9 February 2018

Revised Date: 18 August 2018

Accepted Date: 20 August 2018

Please cite this article as: K. Sheelendra, A. Vijay, Equation of state, thermoelastic properties and melting behavior of NaCl at high temperatures and high pressures, *Journal of Physics and Chemistry of Solids* (2018), doi: 10.1016/j.jpcs.2018.08.027.

Equation of state, thermoelastic properties and melting behavior of NaCl at high temperatures and high pressures

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Abstract

In this study, we used the Stacey reciprocal *K*-primed equation of state to determine the relationships with pressure, volume, and temperature for NaCl up to a temperature of 900*K* and pressure of 25 GPa. The bulk modulus values and pressure derivative were also obtained for the entire range of temperatures and pressures considered in this study. We investigated the thermoelastic properties of NaCl at high temperatures and high pressures using the results based on the equation of state. The pressure dependences of the thermal expansivity and Grüneisen parameter were both determined using the formulations, which satisfied the thermodynamic constraints at infinite pressure. The values of the higher-order Grüneisen parameters were obtained up to fourth order for NaCl at high pressures. The thermal expansivity values for NaCl at high pressures and high temperatures were calculated using the Anderson-Grüneisen formulation. The results obtained using the two methods were compared and discussed. The Grüneisen parameter values determined at different pressures were used to predict the melting curve for NaCl. The melting temperatures obtained at different pressures using the Lindemann-Gilvarry law agreed with the experimental data within 10 %.

Keywords: Equation of state, Grüneisen parameter, Melting curve, NaCl, Thermal expansivity.

PACS numbers: 62.60, 65.40, 65.70