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## Thermodynamic evaluation of the BaO-CaO-YO<sub>1.5</sub> system

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### ABSTRACT:

A series of experiments were performed to study the solid solubility of CaO in BaY<sub>2</sub>O<sub>4</sub>, and the observed results were then adopted to the present thermodynamic evaluation to derive a set of thermodynamic database for the BaO-CaO-YO<sub>1.5</sub> system. The database was constructed by the CALPHAD method where the binary parameters from the BaO-CaO and CaO-YO<sub>1.5</sub> systems were presently optimized, those from the BaO-YO<sub>1.5</sub> system were simulated by our previous assessments, and only limited amount of ternary parameters were introduced. All the model parameters were emanated from the Bragg-Williams approximation where the liquid and terminal solid-solution phases were treated by the one-sublattice model, and two ternary intermediate phases, named BCY (BaCa<sub>2</sub>Y<sub>6</sub>O<sub>12</sub>) and BaY<sub>2</sub>O<sub>4</sub>, were described by the three-sublattice and two-sublattice models, respectively. Good agreement between the experimental data and the calculated results demonstrates that the present thermodynamic database is self-consistent and credible and able to be used to design novel refractory.

**Keywords:** Refractory; Thermodynamic modeling; CALPHAD; BaO-CaO-YO<sub>1.5</sub>; Phase diagram

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