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The energetics of hematite dissolution in iron-oxide-rich melts: In situ high-temperature calorimetric studies

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Abstract

Iron-oxide-rich melts are encountered in iron-ore sintering, smelting, and other industrial processes, whereas melts containing iron oxides but richer in silica are the mainstay of igneous processes near the Earth's surface and at depths down to the core-mantle boundary. High-temperature calorimetry has been used to evaluate the enthalpy of solution of Fe_2O_3 in a series of iron-oxide-based melts at 1353 °C. For a typical melt found in iron-ore sintering, the heat of solution of Fe_2O_3 is 54.4 ± 5.9 kJ/mol, with no dependence on the Fe_2O_3 concentration between 59 and 69 mol%. The heat content of a series of samples (59 to 64 mol% Fe_2O_3), measured by transposed-temperature drop calorimetry, is also independent of composition.

Keywords: Hematite, iron-oxide-rich melts, high-temperature calorimetry, heat of solution