Progress in data assessments for the HotVegas project

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ABSTRACT

The oxide system Al_2O_3-CaO-MgO-SiO_2 relevant to fuel ashes and slags which is suitable both for applications in the coal burning and in the gasification processes is thermodynamically described using all available experimental data.
All binary and ternary subsystems are optimised using the associate species model for the liquid phase. The binary Al_2O_3-MgO Spinel phase was re-optimised taking into account the available experimental data for the Al_2O_3-CaO-MgO-SiO_2 system.

The Cordierite $Al_4Mg_2Si_5O_{18}$ and Sapphirine $Al_{18}Mg_7Si_3O_{40}$ phases are described as solid solutions because of their experimentally determined wide solubility ranges.

The existence of the quaternary phase $Al_8Ca_6MgSiO_{21}$ (Q-Phase) is confirmed by some experiments; thermodynamic parameters of this quaternary compound are assessed from subsolidus reactions.

The Melilite phase is present as quaternary solid solution phase with end members Åkermanite and Gehlenite according to the formula $(Al^{3+},Mg^{2+})(Al^{3+},Si^{4+})(Ca_2SiO_7^{6-})$.