Application of the FactSage in the assessment of fuel slags and the model development for suspension viscosity

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The thermo-physical and chemical properties of fuel slags as function of temperature, composition, and atmosphere are important to control or optimize the operating conditions during combustion or gasification. The various modules and databases in the FactSage are used to predict the properties such as the viscosity, the liquidus temperature, and the reactivity with refractory lining. A general discussion on slag design and optimization under entrained flow gasification conditions will be given.

It is often encountered in practice that the slag changes from a single-phase system to a multiphase system, i.e. crystal-melt suspensions, due to the crystallization. Although the suspension viscosity cannot be directly calculated using the FactSage, the type and relative amount of crystalline phases as well as the viscosity of the remaining liquid slag are predicted, based on which the suspension viscosity can be estimated after one further step, i.e. using for example the modified Einstein-Roscoe model. The critical aspects in developing the viscosity model for suspensions will be discussed.