

Thermodynamic Modelling of the Behaviour of Mineral Matter in the BGL-Gasification Process

STEFAN GUHL

*Department of Energy Process Engineering and Chemical Engineering
Technical University Bergakademie Freiberg, Germany*

ABSTRACT

Trace elements like Na and K and their compounds are known to evaporate in high temperature processes such as gasification. The condensation of their compounds in low temperature areas in gasifiers can cause problems. Therefore, it is important to assess their thermal behaviour. Thermodynamic models can be an excellent tool to carry out this assessment.

The presented model simulates the BGL-gasification process (British Gas – Lurgi) using the thermodynamic software SimuSage™ and FactSage™. Technological problems were linked to the behaviour of mineral components by detailed analysis of process data and samples. Based on process data from a three day period of stable gasifier operation, a material balance was calculated.

Based on the material balance, non-equilibrium states were considered within the model by bypasses. As a major result, with the adjusted model it was possible to describe an alkali cycle within the Gasifier, similar as described for blast furnaces.

Furthermore the model was used to evaluate potential process changes to minimize the circulating alkali amount.