

# **The Use of Thermo-Equilibrium Simulation (FactSage) For Inorganic Mineral Matter Transformation in Gasification Value Addition to Coal and Gasification Research**

*JC van Dyk*  
Sasol Technology

After an introduction of the different types of gasifiers, an overview is given of the major points that play an important part in coal gasification technology, such as mineral phase transformations, slag formation, and slag viscosity. It is then shown how Equilib calculations can be systematised such that their results can be directly related to certain sections of a fixed bed gasifier.

Calculational results for the combustion zone are compared with high temperature XRD results coming from investigations of the mineral phases found in samples taken from the gasifier. Coals from different mines show largely different behaviour.

It is also shown how Equilib and Phase diagram calculations can be applied in the understanding of ash properties such as sintering and slagging temperatures. Parameter studies have been carried out in which the influence of the variation of the composition of certain ash components on the properties has been investigated.

Finally, on the basis of equilibrium calculations an outlook is given on the possible behaviour of underground coal gasification processes.