

Effect Of Gasification Operating Temperature On Either Leachability Of Ash And Migration Of Elements During A UCG Process Or Recovery Of Specific Elements Such As K, Al And Ti From A Fixed Bed Gasification Process – A FactSage Simulation

J.C. VAN DYK^{1,2}, A.C. COLLINS¹, C.A. STRYDOM¹, JF BRAND²

¹ *Chemical Resource Beneficiation, North-West University, Potchefstroom, South Africa*

² *African Carbon Energy, South Africa*

ABSTRACT

Coal is considered a heterogeneous material containing organic and inorganic material (mineral matter). The properties of the coal, i.e. the organic and inorganic matter will vary between coal sources depending on geological conditions and sites.

The types of minerals present in the coal will thus depend on the coal source. These minerals, their quantities and the thermal conditions to which the coal is subjected to (i.e. during a gasification process) will have an influence on the mineral transformation, but importantly, what type and quantity of minerals can be recovered from the produced ash.

Prediction of mineral transformation during thermal treatment has become more difficult as prediction methods become more outdated.

However, FactSage Equilibrium Software supply the option to technically and scientifically predict these transformations and recovery status of specific minerals. The prediction of mineral transformation may be of value as it may be used in the recovery of compounds from coal ash.

The main aim of this study is to investigate the mineral transformation of K, Al and Ti containing minerals and predict in which form they may be present in the coal ash and to predict if these minerals may be recovered.

By using FactSage modelling software, the mineral transformation of 4 international coal samples were investigated under specific gasification conditions.