

Combined Modelling and Experimental Study on the Alkali Phosphates

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ABSTRACT

Within the discussion of the future energy production the thermal gasification of coal and biomass is being investigated as one possible technique. It is well known that the phosphorous amount in coals and biomasses can be significantly high. Therefore, the thermochemical behaviour of alkali phosphates and its influence on thermo-physical properties is of interest in modern energy research. Due to the phosphates' network forming properties known from glass production and the strongly hygroscopic behaviour of phosphates thermochemical measurements are not possible within the whole composition range. This is true for alkali-phosphates containing Sodium and Potassium. Here thermochemical modelling used in combination with DTA and DSC measurements is a powerful tool to obtain reliable datasets on the Gibbs-Energy of the phosphates' slags which can be used for further calculations.

By using the modified associated species approach by Spear, Allendorf and Besmann the Gibbs-Energy-Function for the liquid phase can be described well whereas the data for solid compounds is being measured or taken from a validated database. Resulting from the data obtained phase diagrams can be calculated. We find good agreement with previously published work on the alkali-phosphate systems. In this work we want to present our ongoing research on the thermochemistry of alkali phosphates where predicted phase equilibria are proven by experiment.

References

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