

THERMAL BEHAVIOUR OF WOODY BIOMASS AND ITS RELEVANCE TO COAL THERMOPLASTICITY

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ABSTRACT

Sustainable biomass in modern blast furnaces has given rise to an environmentally friendly option for reducing CO₂ emissions and the use of fossil fuels. In the steel industry, biomass is also seen as a potential additive to coal blends in the production of coke used to feed blast furnaces. Within this framework, the present study aims to shed light on the effect of several woody biomasses on the thermoplastic properties of coking coals, due to the relevance of thermoplasticity to the development of the structure of coke and, consequently, to its physical and chemical behaviour in a blast furnace. As the ratio of the three main components in a biomass (cellulose, hemicellulose and lignin) differs with the source of the biomass in quantity and thermal behaviour, model biopolymers were also studied. An attempt was then made to explain the different degrees of reduction of thermoplasticity in a medium-fluid coal as being due to the type of wood species and to relate it to the thermal behaviour of the model lignocellulosic polymers. Multiple linear regression analysis was applied to a set of woody biomasses with different thermogravimetric patterns and composition in order to assess the contribution of the quantity and source of the volatiles evolved during pyrolysis to the fluidity of blends of coal and biomass.

KEYWORDS: Biomass, Biopolymers, Coking Coal, Fluidity, Thermogravimetry, Volatile Evolution

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