

Study of Minor Components' Effect on Viscosity of Molten Petroleum Coke Slag

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Petroleum coke, a byproduct of the oil refining process has gained some interest to be used as promising feedstock for IGCC plants. It offers high heating value and lower ash content compared to coal. Despite of the benefits offered, petcoke has a very high melting temperature that needs to be considered in order to maintain the performance of gasifiers and to avoid the operational issues due to clogging. Thus, viscosity of molten slag, which is a function of temperature and composition, is necessary in determining gasification temperature appropriately. The petcoke ashes contain VO_x, FeO_x, SiO₂, Al₂O₃, CaO and also minor components such as alkali and alkali oxides. There are several previous studies which investigated behavior of major constituents of petcoke slag, by neglecting the effect of minor components. In this research, the effect of a minor component, MgO, and its interaction with the major components towards the viscosity and crystalline phase formation were investigated. Experiments were conducted using synthetic ash containing 5 major components of petcoke slag (V₂O₃, SiO₂, Fe₂O₃, Al₂O₃, CaO) with the addition of various amounts of MgO under reducing atmosphere. The crystalline phases of cooled slag samples were determined using SEM/EDX and XRD.