

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

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Petroleum coke is a widely used feedstock for IGCC plants that can have a very high melting temperature & viscosity of ash which lead to discontinuous slag tapping. Thus, determining the appropriate gasification temperature through viscosity measurement apparently is necessary to overcome the issues. Several previous studies investigated the effect of major constituents of petcoke slag on slag viscosity, while neglecting the effects of minor components on the viscosity of petcoke slag. Herein, the effect of minor components on the viscosity and crystalline phase formation were investigated using a high temperature viscometer. We determined the viscosities of synthetic ashes containing 5 major components of petcoke slag (V_2O_5 , SiO_2 , Fe_2O_3 , Al_2O_3 , & CaO) with various amounts of 3 minor components, MgO , Na_2O , & K_2O respectively under reducing atmosphere. The crystalline phases were predicted using factsage and compared with those in cooled slag samples, determined using SEM/EDX. It was found that the addition of MgO decreased the viscosity more significantly than Na_2O & K_2O did. Na_2O & K_2O tend to lower the viscosity and T_{cv} at concentration range of 0.5–2% by weight. The differences between the simulation results and experiments were also noticed.