

Effect of various alcohol additives on coal water slurry for entrained flow gasification

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For efficient coal-water slurry (CWS) gasification, it is very important to prepare CWS with higher carbon content and lower viscosity, which improve CWS heating values and atomization of CWS. However, the trade-off relationship between carbon content and viscosity gives rise to the difficulty in preparing CWS with high carbon content and low viscosity. Here we report the preparation of CWS with higher heating values and lower viscosity by employing various alcohol additives such as methanol, ethanol, isopropanol, 1-pentanol, 1-hexanol and 1-octanol with an alcohol content range of 1 wt.% ~ 10 wt.%. In the case of methanol, ethanol and isopropanol with hydrophilic nature, as the added alcohol content increased up to 10 wt.%, the slurry viscosity decreased from 2100 cP to 1089 cP, and heating values increased from 3613 kcal/kg up to 4412 kcal/kg. However, in the case of 1-pentanol, 1-hexanol and 1-octanol with lipophilic nature, the slurry viscosity significantly increased up to the measurement limit (10000 cP) of our viscometer with an increase in the added alcohol content, and the alcohol with a longer alkyl chain gave a much larger increase in viscosity.