Abstract:

Effect of kaolinite on carbonization behaviour of coal was examined by varying kaolinite content up to 10 wt.% of a medium rank high vitrinite, low ash Indonesian coal. The thermoplastic property was characterized using Gieseler Plastometer. Char and tar samples were collected through pyrolysis at 450 °C in a Gray-King apparatus. The macro-molecular composition of char samples was measured using FT-IR, while tar composition was characterised using GC/MS. The plastic temperature range is found to decrease with increasing kaolinite contents of coal blends. The kaolinite presence is shown to improve fluidity up to 5% followed by a notable reduction of fluidity at 10% level. A lower ratio of the CH₃/CH₂ ratio of residual char is found to improve fluidity while higher ratio C=O/C=C bonds favour a decrease of the plastic range. Up to 5 wt.% level, increasing kaolinite decreases proportion of low molecular compounds in tar. The study confirmed the effect of kaolinite presence in the tested coal on thermoplastic behaviour of coal.

Keywords: Coal, char, tar, pyrolysis, coke, kaolinite, GCMS and FTIR

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