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## Co-gasification of coal and biomass: Synergy, characterization and reactivity of the residual char

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### Abstract

The synergy effect between coal and biomass in their co-gasification was studied in a vertical fixed bed reactor, and the physic-chemical structural characteristics and gasification reactivity of the residual char obtained from co-gasification were also investigated. The results show that, conversion of the residual char and tar into gas is enhanced due to the synergy effect between coal and biomass. The physical structure of residual char shows more pore on coal char when more biomass is added in the co-gasification. The migration of inorganic elements between coal and biomass was found, the formation and competitive role of  $K_2SiO_3$ ,  $KAlSiO_4$ , and  $Ca_3Al_2(SiO_4)_3$  is a mechanism behind the synergy. The graphitization degree is enhanced but size of graphite crystallite in the residual char decreases with biomass blending ratio increasing. TGA results strongly suggest the big difference in the reactivity of chars derived from coal and biomass in spite of influence from co-gasification.

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