SYNERGETIC EFFECT DURING BIOMASS CO-FIRING UNDER OXY-FUEL CONDITIONS

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Abstract:
The interaction between biomass and coal has been investigated extensively during co-pyrolysis under conventional air-fired conditions. Little information is available on biomass/coal interaction under oxy-fuel firing especially at high heating rate and high temperature environment. This study examines the impact of co-firing biomass and coal under oxy-fuel condition compared to normal air firing in terms of volatile yields, synergetic effect and the catalytic effect of biomass-contained alkali and alkaline metals on coal char burnout. 50:50 wt% blends of biomass and coal were mixed thoroughly together before feeding into the drop tube furnace (DTF) at 1100, 1300 and 1450°C at 200ms.

Significant increases in volatile yields were observed for the co-devolatilisation under oxy-fuel and air-firing conditions but the increase was more pronounced for oxy-fuel conditions, highlighting the synergistic effect may vary with combustion conditions. Improved char burnout performance was observed for the chars produced under both firing conditions and again, it was found that the biomass/coal char from oxy-conditions were found to be more reactive. The results indicate that biomass can serve as effective catalysts to improve coal devolatilisation and combustion efficiency.

Keywords: Biomass co-devolatilisation, Oxy-fuel combustion, catalytic effect of biomass minerals

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