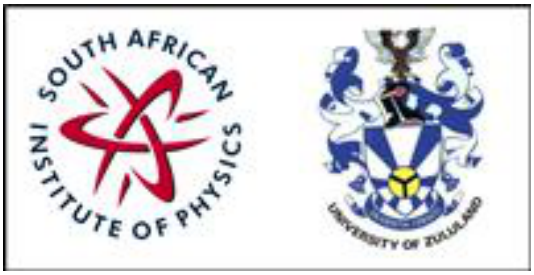

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The properties and suitability of various biomass/coal blends for co-gasification in a downdraft biomass gasifier

Wednesday, 10 July 2013 17:40 (1 hour)

Abstract content
   (Max 300 words)

Gasification is a promising technology for the production of mainly gaseous fuels such as syngas, which is produced from the hydrocarbon-based materials. Currently, coal is the main feedstock that is used for the gasification process because of its large reserves and higher energy per volume. However, the use of coal has been a more concern because of the environmental impacts caused by the emission of toxic gases such as the sulphides, sulphates and nitrates as well as the ash slagging problems forming inside the gasifier. On the other hand, biomass is a renewable energy resource of interest as a replacement for coal to reduce the environmental impact associated with fossil fuel usage. Much consumption of fossil fuels has caused serious energy crisis and environmental impacts, globally. Co-gasification of coal and biomass is considered as a connection between energy production based on fossil fuels and energy production based on renewable fuels. The utilization of biomass by co-gasification with coal causes reductions of carbon dioxide, nitrogen and sulfur emission due to the renewable character of biomass and low contamination content in biomass. This study seeks to determine the properties of various biomass/coal blends and their suitability for co-gasification in a downdraft biomass gasifier. Energy Dispersive X-ray (EDX) analysis was carried out to determine the elemental analysis of the material. Fourier Transform Infrared (FT-IR) spectrophotometer was used to determine the functional groups present in the material. Thermogravimetric analysis (TGA) was conducted to investigate the thermal degradation of the material. The kinetic analysis of the various feedstocks allows the prediction of the rate at which co-gasification takes place. The results suggested that blending coal with biomass result in faster reaction rate at lower temperatures than that of coal alone and lower activation energy due to the high quantity of volatile matter in biomass.

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MSc

Main supervisor (name and email)
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