INFLUENCE OF OPERATIONAL PARAMETERS ON TAR FORMATION AND MAIN GAS COMPONENTS DURING ALLOOTHERMAL STEAM GASIFICATION

Abstract:
Gasification is considered to be a promising way to use biomass with high efficiency in combined heat and power production, for the production of second generation biofuels and in the chemical industry. This paper reports experimental results concerning the influence of operational parameters during allothermal steam gasification on tar formation and on the main gas components. During the experiments in a bubbling fluidized bed gasifier, the following operational parameters were varied: temperature (700°C → 840°C), pressure (1 → 2.5 bar absolute) and steam/biomass (S/B) ratio (0.8 → 1.2). Three biomass fuels, standard wood pellets (Agrol), Willow pellets and pellets from dried distiller's grains with solubles (DDGS), were investigated. It was found that rising temperature reduces the total tar content and affects more heterocyclic and light aromatic than polyaromatic compounds. An increase in the S/B-ratio leads to a decreasing total tar content, for low temperatures the maximum is observed at medium S/B. Increasing pressure leads to increasing total tar due to increasing light PAH's, the effect is most distinct for low (S/B). The effects on the main gas components are as can be expected by equilibrium considerations.