

A Study of Wood Gasification in a Fixed Bed Microreactor

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Gasification of pine, oak, acacia and ginkgo woods was carried out in a fixed bed updraft microreactor to understand effect of major experimental parameters on the product distribution and the composition of gaseous products. Major experimental parameters include moisture content and particle size of the woody reactants, reaction temperature, temperature increasing rate and holding time. Analysis of the feedstocks showed about 80 wt% volatile content, 0.3 wt% ash content and 4,500 kcal/kg heating value on a dry basis. Product distribution had an average of 40 wt% liquid, 40 wt% gas and 20 wt% solid at 800 °C, 20 °C/min increasing rate and 0 min holding time. It was slightly affected by the woody properties such as kind, moisture content and particle distributions. Other gasification parameters gave a negligible effect on the product distribution. However, the composition of gaseous products was affected by all the experimental parameters. Hydrogen production was favored by increase in the reaction temperature and temperature increasing rate while inhibited by increase in particle size and moisture content of the reactants. On average, the composition of H₂, CO and CH₄ was 40, 30 and 10 vol%, respectively.