

## **EXPERIMENTAL INVESTIGATIONS OF WOOD GASIFICATION IN DOWNDRAFT GASIFIER AND PREDICTION OF GAS COMPOSITION USING THERMODYNAMIC EQUILIBRIUM MODEL**

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### **Abstract**

Gasification is a complex process involving drying, pyrolysis, oxidation and reduction of the solid carbaneous fuel into useful chemical energy. Thermochemical conversion yields low calorific value gas whose composition is a mixture of CO,CO<sub>2</sub>,CH<sub>4</sub>,H<sub>2</sub>O,N<sub>2</sub>,H<sub>2</sub> and other gases such as NH<sub>3</sub>, H<sub>2</sub>S etc.,. The gasification reaction for woody biomass is modeled using thermodynamic equilibrium model and composition of producer gas (mixture of CO & H<sub>2</sub>) is estimated. A Matlab code is developed to solve the non linear equations using Newton method. The estimated gas composition is compared with the producer gas obtained by thermochemical conversion of biomass in a 32KW<sub>e</sub> capacity down draft gasifier designed at center for Energy Technology, Osmania University. The gas composition is measured using Gas chromatograph and compared with the estimated values. A very small trace of methane is observed in the comparative analysis and LHV of the gas is also estimated.

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**Keywords :** Gasification, Producer gas, Biomass

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