

An experimental study of updraft biomass Gasifier using biofuels

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ABSTRACT

The gasification technology has been facing number of obstacles since its beginning. The relative cost and availability of fossil fuels determine the focus and research in gasification. This study is concentrated on the testing and comparing the composition of syngas produced in a 0.221 m³ fixed bed updraft gasifier from the combustion of coconut shell and biofuel briquette. The firing of the gasifier was done for a period of 8 hours and readings were taken at regular intervals. The composition of the syngas was estimated using Orsat apparatus which uses Potassium Hydroxide for carbon dioxide and Ammoniacal Cuprous Chloride for carbon monoxide. And the composition of CO in syngas produced using coconut shell was 25% that of using briquette it was relatively less. So, coconut shell can be concluded as a most suitable fuel for an updraft gasifier as compared to biofuel briquette.

Key words : Biomass gasifier, Coconut shell, Briquette, Syngas, Orsat apparatus

Introduction

Biomass is one of the effective source of renewable energy since ancient times. It has not been popularly used because of the inefficient combustion devices used for generating energy which further adds to pollution problems. Agricultural residues including crop residues such as rice husk, coconut shells, groundnut shell, cotton stalks, jute sticks, maize cobs, bagasse, etc. can be used for gasification (Leonard *et al.*, 2014). An effort has been made to cover technology for fuel generation from biomass which includes biomass oil, slurry fuel and biomass briquette through thermochemical conversion (high-pressure liquefaction and fast pyrolysis) (Agarwal and Agarwal, 1999). An effort has been made to con-

struct a commercial 400 MWe, two stage gasifier using rice husk as fuel on which it was necessary to perform a further development and study of the optimized conditions to achieve a desired operation in the plant (Sarasuk and Sajjakulnukit, 2011). A variety of biomass gasifiers have been developed. Differentiation is made based on the means of supporting the fuels in the reactor, the direction of flow of both the fuels and oxidant, and the way heat is supplied to the reactor. Gases formed by gasification are contaminated by some constituents such as particles, nitrogen components, tars, sulfurs and chlorides. In this work, a global perspective about the producer gas final composition dependence, the so-called syngas, from the biomass, oxidizer, reactor type, temperature and pressure is given based on

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