

Effect of Temperature on Biomass Gasification: A Review

Abstract

The main objective of this paper is to review the effect of temperature on the performance of biomass gasification process that is the most significant parameter among other parameters such as Pressure, particle size, type of catalyst, type of gasifier, Resident time, ER(equivalent ratio), BR (steam to biomass ratio) and gasifying agent. Higher temperature improved the gasification process. With a higher reaction temperature, the yield of the total gas flow rate, desired product, hydrogen, and syngas are increased as well as the low heating value of dry product gas. So temperature needs to be controlled accurately.

Keywords: Biomass gasification, Temperature, syngas

چکیده

هدف اصلی این مقاله مروری بر تاثیر دما بر روی کارایی فرایند گازی سازی بیوماس می باشد که مهمترین پارامتر در بین پارامترهایی همانند فشار، اندازه ذرات، نوع کاتالیست، مدل گازیفایر، زمان ماند، ER (نسبت هوای تزریق شده به هوای تئوری مورد نیاز برای احتراق کامل)، BR (نسبت تزریق بخار به بیوماس) و عامل گازی سازی می باشد. دمای بالا باعث بهبود کارایی فرایند گازی سازی می گردد. با افزایش دمای واکنش، دبی گازهای حاصله، محصولات مطلوب، هیدروژن و سینگاز حاصله نیز افزایش یافته همچنین افزایش دما باعث افزایش ارزش حرارتی پایین محصولات گازی می گردد. بنابراین دما طی فرایند گازی سازی باید به دقت کنترل گردد.

1. Introduction

With the rapid increase of world energy consumption and serious environmental pollutions caused by the utilization of fossil fuels, sustainable energy systems are considered as an effective way to resolve issues of concern today including greenhouse gas emissions, national energy security, air pollution, and energy efficiency [1].

Biomass is the fourth largest source of energy in the world, accounting for about 15% of the world's primary energy consumption and about 38% of the primary energy consumption in developing countries [2] and has been recognized as a major world renewable energy source to supplement declining fossil fuel resources [3]. Energy from it has the potential to meet the energy demands of the world given its abundant availability on a sustainable basis [4].

Biomass is currently available in large quantities as waste from agriculture and forestry e.g. wood, straw, rice husks. If managed as an energy crop, it is claimed [5] that 1.38 billion tonnes dry weight of biomass could be produced in the USA without disturbing current agricultural and forest practices.