Poster E13

Analysis of Supercritical Water Gasification of Cellulose at Continuous System

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Nowadays, new industrial processes with ecological, economic and social advantages are demanded. Moreover, dependence on fossil fuels as the main energy sources has led to serious energy crisis. To solve these problems, diverse efforts have been made to find clean, renewable alternative sources of energy. In this context, biomass is a renewable energy resource, and the net emission of CO_2 during its utilization process is zero. In spite of the large worldwide biomass resource potential, quite a lot of biomass is not efficiently used at present. Among the technologies proposed for biomass conversion into energy, Supercritical Water Gasification is one of the most promising. With this technology, besides the purification of industrial wastewaters, it is possible to carry out the use of their energy potential by burning the gas effluent generated (with a great heating power due to its high content in hydrogen and slight hydrocarbons). Moreover, a drying procedure is not required as supercritical water is not only a solvent for organic materials but also a reactant. As the main component of biomass, cellulose has been extensively studied, and its decomposition has been carried out at both subcritical and supercritical conditions [1]. In these conditions, cellulose initially hydrolyses, producing oligomers that further hydrolyse to form glucose [2]. Glucose then undergoes an extraordinary variety of reactions to ultimately produce gases, which consist mainly of CO_2 , H_2 , and CH_4 . Species in the gas phase can react with each other, and depending on the reaction conditions, this can greatly affect the product distribution. However, most previous works of this model compound were carried out at batch reactors. This study analysed the effect of temperature (450-525°C), the amount of oxidant (from total absence of dissolved oxygen to 30% of stoichiometric oxygen, n = 0.3), the initial concentration of organic matter (0.5-5 wt.%) and the residence time (2-10s) on SCWG of cellulose at a continuous reactor.

References

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