

Evaluation of the Gasification Process for the Generation of Syngas Using Solid Waste at the Autónoma de Colombia University

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Abstract : Solid urban waste represents one of the largest sources of global environmental pollution due to the large quantities of these that are produced every day; thus, the elimination of such waste is a major problem for the environmental authorities who must look for alternatives to reduce the volume of waste with the possibility of obtaining an energy recovery. At the Autónoma de Colombia University, approximately 423.27 kg/d of solid waste are generated mainly paper, cardboard, and plastic. A large amount of these solid wastes has as final disposition the sanitary landfill of the city, wasting the energy potential that these could have, this, added to the emissions generated by the collection and transport of the same, has as consequence the increase of atmospheric pollutants. One of the alternative process used in the last years to generate electrical energy from solid waste such as paper, cardboard, plastic and, mainly, organic waste or biomass to replace the use of fossil fuels is the gasification. This is a thermal conversion process of biomass. The objective of it is to generate a combustible gas as the result of a series of chemical reactions propitiated by the addition of heat and the reaction agents. This project was developed with the intention of giving an energetic use to the waste (paper, cardboard, and plastic) produced inside the university, using them to generate a synthesis gas with a gasifier prototype. The gas produced was evaluated to determine their benefits in terms of electricity generation or raw material for the chemical industry. In this process, air was used as gasifying agent. The characterization of the synthesis gas was carried out by a gas chromatography carried out by the Chemical Engineering Laboratory of the National University of Colombia. Taking into account the results obtained, it was concluded that the gas generated is of acceptable quality in terms of the concentration of its components, but it is a gas of low calorific value. For this reason, the syngas generated in this project is not viable for the production of electrical energy but for the production of methanol transformed by the Fischer-Tropsch cycle.

Keywords : alternative energies, gasification, gasifying agent, solid urban waste, syngas

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