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EFFECTS OF ELECTRON BEAM IRRADIATION OF THE ACID
HYDROLYSIS OF SUGARCANE BAGASSE

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Early cellulose hydrolysis trials using diluted acids started in the middle of the last century but, since the hydrolysis reactions occur under drastic temperature and pressure conditions, this process was always considered economically unfeasible. Nowadays, there are many researches being carried out, in order to facilitate hydrolysis reactions of lignocellulosic materials using pre-treatment processes.

This paper presents the results using an electron beam irradiation processing as a pre-treatment, to increase the reducing sugar produced from acid hydrolysis of sugarcane bagasse, that is nowadays the main cellulosic residue produced in Brazil.

Samples of dry bagasse were irradiated with 200 kGy from an industrial electron accelerator, Dynamitron II. After the irradiation, the bagasse pulverized at 50 Mesh was hydrolysed with sulfuric acid, at concentrations of 0.25% and 0.5% w/w in a batch system and the reaction temperatures of 165°C and 195°C were studied.

The irradiated bagasse powder produced a reducing sugar concentration 42% higher than the non irradiated one after 70 minutes of reaction at 165°C using 0.5% w/w sulfuric acid. These results show that the use of electron beam irradiation as a pre-treatment of lignocellulosic materials can turn the process commercially feasible. The decrease of the hydrolysis reaction time and the increase of sugar yield in the treated material, compensate the additional irradiation costs.