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TRATAMIENTO DE RESIDUOS CELULOSICOS MEDIANTE LA
IRRADIACION CON ACELERADORES DE ELECTRONES Y AMONIA

O. Kikuchi and N. del Mastro

Industrial & Engineering Application Coordination IPEN-CNEN, Sao Paulo, Brasil

Abstract

In Brazil a huge amount of agricultural resources such as lignocellulosics coming from crop residues are discarded or under utilized. Upgrading of these wastes into useful end-products can be expected not only to recycle the agro-resources but also to reduce pollution. Cellulosic wastes are the most abundant renewable resource of organic carbon. The improvement of its quality is essential for cellulosic wastes to be used for animal feeds since the nutritive values of them are poor. Ionizing radiation can be used to degradate cellulose in order to increase the digestibility and ammonia could be used to increase N_2 content of those materials.

For a microscopical analysis, a combination of electron beam (EB) irradiation followed by gaseous anhydrous ammonia treatment on cellulosic wastes such as sugarcane bagasse, cotton straw and rice hull was applied. Irradiation was carried out with an EB accelerator Dynamitron (Radiation Dynamic Inc), Energy 1.4 Mev, current 13.4 mA, doses 20 and 40 kGy. Cells were separated using a Franklin maceration solution modified by Normand, dyed with safranin and observed under a Zeiss transmission and polarising microscope.

The tracheary elements, tracheids and vessel members, have their walls constituted mainly by polysaccharides, rich in cellulose microfibrils and with lignin deposited between the adjacent chains of polysaccharide. The fibres, one of the supportive tissue elements of the plant, have the second wall relatively thick, rich in cellulose, hemicellulose and lignin. The degradation of the cellulose and the hemicellulose by radiation occurs by a process of depolymerization. However, aromatic compounds in the lignin and other extractives seems to act as protective components against the radiation-induced scissions in the cellulose. The treatment and the doses used in this work was not enough to cause a drastic morphological changes within the fibres and the tracheary elements of sugarcane bagasse and other agricultural wastes.