

EFFECTS OF HYDROTHERMAL TREATMENTS ON NANOSCALE POROSITY OF SUGARCANE BAGASSE

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ABSTRACT

This study characterized the nanoscale porosity of lignocellulosic materials obtained from hydrothermal treatments of the fibrous fraction of sugarcane bagasse. Porosity was characterized with thermoporometry by differential scanning calorimetry (TP-DSC). TP-DSC determines porosity from measured heat flows associated to ice melting that undergoes below 0°C because of nanoscale confinement. This technique is suitable to characterize lignocellulosic materials in water-saturated states. Effects of reaction time and temperature on porosity were evaluated. The hydrothermal treatments followed experimental design 2² with star configuration, using time and reaction temperature with independent variables. Hydrothermal treatments were performed at 150-190 °C during 20-60 minutes, with solid-liquid ratio of 1:10 (w/v). The solubilization solids yielded 6-35% of the initial dry mass. Pore size distributions were more affected by reaction temperature than by reaction time. The reaction temperature has significance on porosity for all pore diameters.