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Luis Vaquerizo, Nerea Abad Fernández, Rafael B. Mato, María José Cocero

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Luis Vaquerizo [a], Nerea Abad Fernández [a], Rafael B. Mato [a], María José Cocero [a,*]

a) High Pressure Processes Group, Department of Chemical Engineering and Environmental Technology, University of Valladolid (Spain). Prado de la Magdalena s/n. 47011, Valladolid, Spain.

* Corresponding author. Tel: +34 983423174; fax: +34 983423013, mjcocero@iq.uva.es (M.J. Cocero)

E-mail addresses: lvaquerizo@iq.uva.es (L. Vaquerizo), nerea.abad@uva.es (N. Abad Fernández), rbmato@iq.uva.es (R.B. Mato), mjcocero@iq.uva.es (M.J. Cocero)

Abstract

Conventional kinetic models of cellulose hydrolysis in supercritical water do not accurately represent the operation with concentrated suspensions since they neglect the mass transfer effects. This work proposes a kinetic model which is able to reproduce cellulose hydrolysis at high concentrations providing the optimum reaction conditions to obtain nanocellulose particles and oligomers of controlled size. The basic idea of the model, which is applicable to other lignocellulosic materials, is that the hydrolysis of the cellulose particles generates an oligosaccharides layer which creates a mass transfer resistance. Therefore, it considers both the diffusion of the water molecules from the bulk phase to the surfaces of the cellulose particles and the superficial hydrolysis kinetics. Experimental points were obtained working with two different cellulose types (*Dp* = 75µm and *Dp* = 50µm) at 390ºC and 25MPa, residence times between 50ms and 250ms and initial cellulose suspension concentration from 3% to 7% w/w (1% to 2.3%