

## A MODELLING STUDY OF THE COAGULATION STEP IN THE CHITOSAN SPINNING PROCESS

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The chitosan is a polysaccharide derived from chitin. After cellulose, chitin is considered the second most abundant polysaccharide in the world. From the chemical point of view, the chitin molecule is derived from the cellulose molecule, by substituting a hydroxyl group (-OH) with an 'acetamido' one (-NH-CO-CH<sub>3</sub>) at the position C-2. The chitosan is the N-de-acetylated derivative of chitin. An important characteristic of chitosan is its degree of acetylation, DA (the fraction represented by the 'acetamido' groups from total number of 'acetamido' and 'amino' groups, sometimes expressed as a percentage). The boundary between chitin and chitosan can be traced around 60% of degree of acetylation (DA). Other authors are considering this border situated at a DA 50%. A polymer with a DA greater than 50% is called chitin, whereas a polymer with DA lower than 50% is called chitosan. However, this border is influenced by several parameters such as the degree of polymerization, the chitin extraction and de-acetylation processes, the distribution of acetyl units, the pH and the ionic strength of the solution. In practice, the chitosan usually refers to a family of polymers derived from chitin, obtained by deacetylation, rather than a well-defined compound.

In an important number of applications, the chitosan is used in the state of hydrogel, obtained from aqueous solutions, by coagulation. The mechanism of chitosan coagulation is very complex and not fully proven. This involves many parameters such as polymer concentration, degree of acetylation, average molecular weight, the nature of coagulation agent, concentration of coagulation agent, temperature of the coagulation bath.

The aim of this work was to develop a mathematical model of the chitosan fibers coagulation, during the wet spinning process. The developed model was tested using spinning experiments data obtained on a laboratory scale setup. The agreement between calculated and measured data, demonstrated the adequacy of the proposed model.