

PP 9 - Two-Component Solvent for Measurements of Average Molecular Weight of Chitosan with High Degree of Deacetylation

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Basic studies on chitosan and practical applications of this biopolymer require knowledge of its major physiochemical properties, especially molecular weight and degree of deacetylation (DA). Measurements of average molecular weight by viscosity, HPLC-GPC or light scattering methods require suitable solvents for molecular dissolution of chitosan. Most of them consist of three components: water, acid and salt, (addition of salt causes screening of charges on polymer chains and thus provides coiled conformation of macromolecules desired for the above mentioned measurements).

In this work we demonstrate that it is possible to use a simpler, two-component aqueous solvent to obtain coiled conformation of chitosan chain. Our studies show that for chitosan with DA 80-90 % these conditions can be achieved in aqueous solution of 0.05-0.2 M hydrochloric acid, when low chitosan concentrations are used. Excess of fully dissociated strong acid in relation to stoichiometric amount of amino group on chitosan chains plays the role of neutral electrolyte (salt) and leads to a partial screening of repulsive interactions between ionic groups of chitosan. Results (R_g , reduced viscosity) obtained using this solvent are comparable to a system containing stoichiometric amount of HCl and relevant amount of NaCl to provide the same ionic strength. Studies on optimization of the solvent and determination of the (DA-dependent) Mark-Houwink constants are under way.