^{1}H- NMR Relaxation Study of the Chain Dynamics of Chitosan as a Fuction of DP and DA

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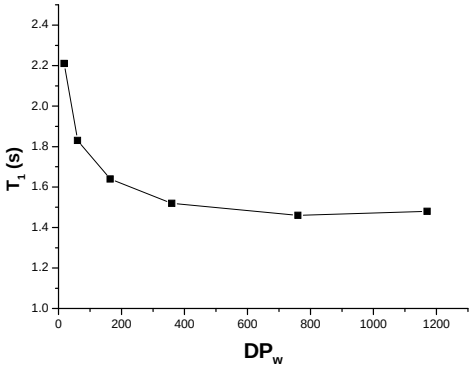
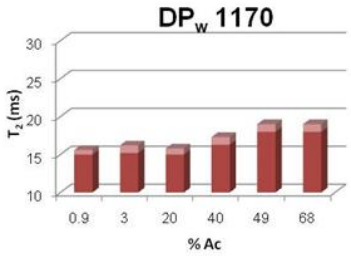
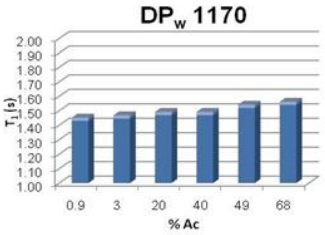
Chitosan is a linear polysaccharide comprising variable proportions of glucosamine and N-acetylglucosamine bonded through β(1-4) linkages. Thanks to its low toxicity, and high biodegradability and biocompatibility, chitosan has emerged as an interesting biopolymer with applications in biomedicine, drug delivery, and biofabrication.[1] Most of the biological, physical, and physiochemical properties of chitosan are determined by the degrees of acetylation (DA) and polymerization (DP). The conformation and dimension of chitosan chains in aqueous solution have been investigated by viscometry, fluorescence, and light scattering, however no reports on its dynamics by NMR relaxation in solution has been published yet. Herein, we describe a study of ^{1}H NMR relaxation parameters on a wide collection of chitosan samples with different DP and DA. Molecular weight dependences on T_1 and T_2 were analyzed in terms of overall *vs* segmental mobility, [2] revealing chitosan to be much more rigid than most polysaccharides previously analyzed, [3] in agreement with its polyelectrolyte nature. Relaxation times dependence on DA was interpreted in terms of the chain stiffness, with increasing mobility at higher DA.







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[2] Heatley, F. *Progr. NMR Spectrosc.,* **1979,** *13*, 47.
[3] (a) Tylianakis, M., A. Spyros, Dais, Taravel, F. R., Perico, A., *Carbohydrate Research,* **1999** *315*, 16. (b) Dais, P., Vlachou, S., Biomacromolecules, **2001**, *2*, 1137.