



## INFLUENCE OF MOLECULAR WEIGHT ON THE VISCOELASTIC PROPERTIES OF POLYELECTROLYTE COMPLEX.

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**Introduction.** Rheological properties of polyelectrolyte complexes are an important tool used to know the interaction degree during the complexation. Particularly, the gum arabic/chitosan (GA/Ch) complex has shown important applications in food science and biotechnology. However, the rheological properties, solubility and surface adsorption of Ch solutions depend on the average molecular weight (MW) and degree of deacetylation (DDA) (1), and thus the final properties and the degree interaction of the complex could be changed. The aim of this work was evaluated the influence of the molecular weight of chitosan in the viscoelastic properties of the gum arabic/chitosan complexes.

**Methods.** Two different GA/Ch complexes (5%wt) were prepared using low and medium molecular weight chitosan ( $Ch_{LMW}$  &  $Ch_{MMW}$ , respectively) at constant pH value of 4.5 (2). The dispersions were left to rest at 20°C for 7 days. The turbidity of the soluble complex was characterized by measuring the optical density at 600 nm using a Cinstra 6 UV-Vis spectrophotometer (GBC Scientific Equipment Pty., Braeside, VIC, Australia)(3). Complex coacervate yield (CCY) was determined by mass balance (3). Viscoelastic properties were carried out over an extended angular frequency ( $\omega$ ) domain of 0.1-100 rad  $s^{-1}$  under the LVER using an AR1000 rheometer (TA Instruments, Newcastle, DE, USA) coupled to a truncated cone-plate geometry (1°, 60 mm diameter) with a gap of 0.029 mm.

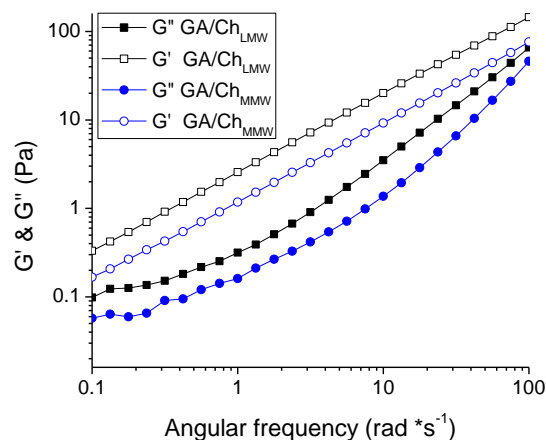
**Results.** Table 1 shows the turbidity and CCY of the different molecular weight of Ch. The results show significant difference ( $p < 0.05$ ) in CCY.

**Table 1.** Complex coacervates yield and the turbidity as a function of chitosan molecular weight.

	Turbidity	CCY (%)
$Ch_{LMW}$	$0.07 \pm 0.04^a$	$85.9 \pm 2.2^a$
$Ch_{MMW}$	$0.05 \pm 0.01^a$	$93.5 \pm 1.7^b$

Fig. 1 shows the variation of elastic ( $G'$ ) and viscous ( $G''$ ) modulus as a function of the

angular frequency of the coacervate phases  $GA/Ch_{MMW}$  and  $GA/Ch_{LMW}$ . Both systems display predominantly liquid-viscoelastic behavior ( $G'' > G'$ ) and frequency dependence in the entire studied interval. The highest modulus values exhibited by the  $GA/Ch_{LMW}$  coacervate phase suggest a higher interaction degree between the GA and  $Ch_{LMW}$  chains, probably due to an increased number of  $Ch_{LMW}$  molecules that enhanced the polymer-polymer interactions to form a more intrinsic interweaving complex polysaccharide network.



**Fig.1** Oscillation frequency sweep of complex coacervates obtained with different chitosan molecular weight.

**Conclusions.** The molecular weight of Ch has a significance influence in CCY and rheological properties of the polysaccharide complexes. A less structured system could be formed using a higher molecular weight chitosan.

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