

# Biopolymers: synergy between carrageenan and locust bean gum



## Introduction

Biopolymers are of outmost interest due to their almost infinite possibilities in structuring and texturing samples. Moreover, biopolymers show strong interactions with other biopolymers, i.e. the combination of two biopolymers can result in better rheological properties as the respective biopolymers alone. This is the case of  $\kappa$ -carrageenan (Carr) and locust bean gum (LBG). LBG does not form a gel itself, but added to a carrageenan dispersion, it increases significantly the elasticity of the sample.

## Materials & method

$\kappa$ -carrageenan, locust bean gum and KCl were purchased from Sigma-Aldrich and used as received. A 1 % (w/w) biopolymer dispersion was obtained by heating the sample under stirring to 90°C. Note: 0.1% of polystyrene particles (1 $\mu$ m, Spherotech) were added to ensure multiple backscattering.

## Viscoelastic properties

Figure 1 shows the typical MSD signatures of a pure LBG dispersion (pink), a pure  $\kappa$ -carrageenan dispersion (red) and a mixed dispersion of 40/60 LBG/ $\kappa$ -carrageenan (blue) at 25°C. The straight line of pure LBG sample indicates a purely viscous behaviour, with low viscosity. The pure carrageenan, and the 40/60 LBG/carr sample have a MSD curve with a plateau, which indicates viscoelastic behavior. The height of the plateau is linked to the elasticity. The lower the the plateau is, the higher is the sample's elasticity

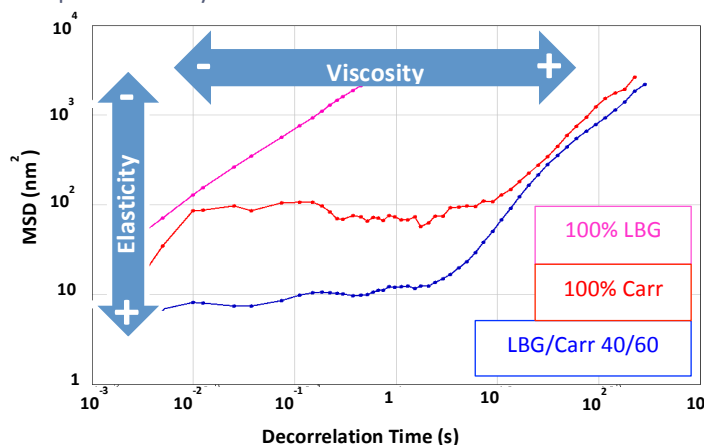


Figure 1. MSD curves of pure LBG, pure carrageenan, and a mixture of 40/60 LBG/carr at 25°C.

Figure beside shows the Elasticity Index (EI) and the Macroscopic Viscosity Index (MVI) as a function of the LBG weight fraction. The higher these index are, the higher is the sample's elasticity or viscosity. The elasticity increases in comparison to the pure carrageenan gel, when low mass fraction of LBG are used. It reaches a maximum at 40/60 ratio of LBG/Carr. At higher LBG content the elasticity decreases significantly. Contrary to the elasticity, the viscosity increases only slightly. This is the expected behavior as described by Dea et al. (Adv. Carbohydr. Chem., 1975).

