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| Title | Processing and formulation effects on rheological behavior of barley beta-glucan aqueous dispersions |
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| Citation | Food Chemistry Volume 91, Issue 3, July 2005, Pages 505-516 |
| Keyword | glucan; Gelation; Freeze–thaw; Cryogels; Rheology; Flow behavior; Response surface methodology; Mathematical modeling; Acid hydrolysis |

**Abstract**

A freeze–thaw cycling process applied to barley β-glucan aqueous dispersions resulted in network structure development, which remained intact after thawing in both acidic and neutral conditions. The effects of freeze–thaw cycling were milder in the presence of sucrose where β-glucans were less prone to cryogel formation, giving weaker cryostructurates. The effect of three operating factors (β-glucan content, sucrose content and salt content) and their interactions on viscosity at shear rates of 10, 50 and 125 $s^{-1}$ was studied using response surface methodology. Significant positive linear effects were identified for all the factors on the first two models, while salt was not significant for the response at 125 $s^{-1}$. The β-glucan also exhibited significant negative quadratic effects for all three responses. Significant negative interactions were observed between β-glucan and sucrose, and β-glucan and salt for the viscosity at 10 and 50 $s^{-1}$, while for the viscosity at 125 $s^{-1}$, only the interaction between β-glucan and sucrose was significant. Response surface methodology and a second order regression model were used for the study of three factors (pH, temperature and time) influencing the viscosity of β-glucan dispersions of a low and a high molecular weight sample, following acid hydrolysis. Significant linear effects on viscosity of the low and high molecular weight samples were obtained for all the factors. A significant positive interaction effect was observed between pH and time for the viscosity of the lower molecular weight sample, while time exhibited a significant negative quadratic effect for the response of the high molecular weight sample. Acid hydrolysis had a stronger impact on viscosity reduction of the high molecular weight sample.