

# ELONGATIONAL PROPERTIES OF BINARY AND TERNARY SYSTEMS CONTAINING XANTHAN GUM FOR MANAGEMENT OF DYSPHAGIA

Mihaela Turcanu<sup>1</sup>, Sébastien Secouard<sup>2</sup>, Corneliu Balan<sup>1</sup>, Edmundo Brito<sup>2</sup>, Crispulo Gallegos<sup>2</sup>

<sup>1</sup> REOROM - “Politehnica” University, Bucharest, Romania

<sup>2</sup> Innovation Centre “Complex Formulations”, Fresenius Kabi Deutschland GmbH, Germany

## ABSTRACT

It has been recently acknowledged that extensional rheology could also play an important role in the development of dysphagia-oriented products since the elongational properties of thickened fluids may affect the characteristics of the swallowing process.

Complementary to shear measurements, CaBER device is used to study uniaxial elongational behaviour of binary systems of gums and of Xanthan-Guar mixtures in the presence of different types of starches. The effect of alpha-amylase on these mixtures is also studied.

## RESULTS

### Extensional rheology

Binary mixtures composition strongly influences breakup time (Fig. 1) and filament shape (Fig. 2)

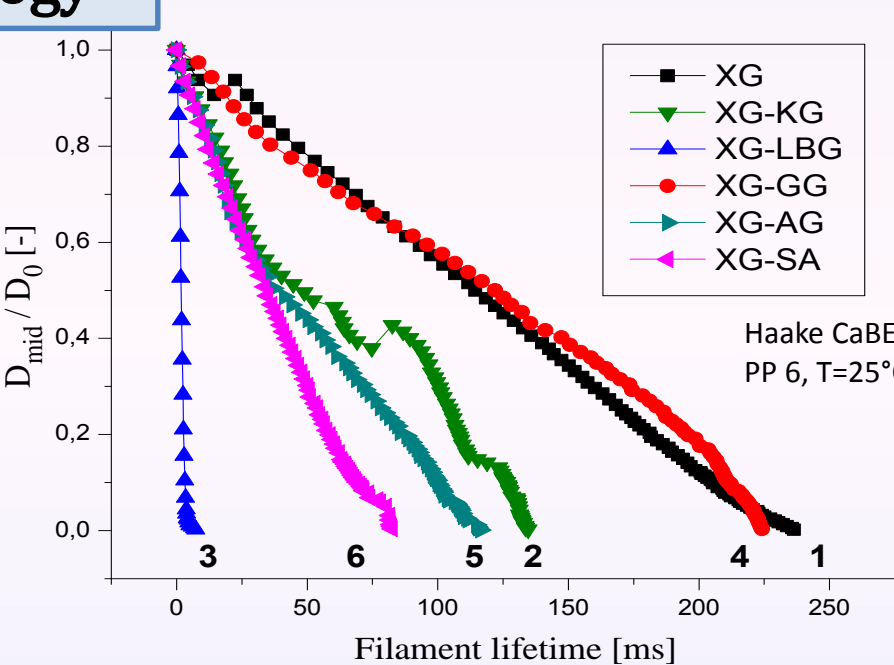


Figure 1. Breakup time of gum-based binary mixture

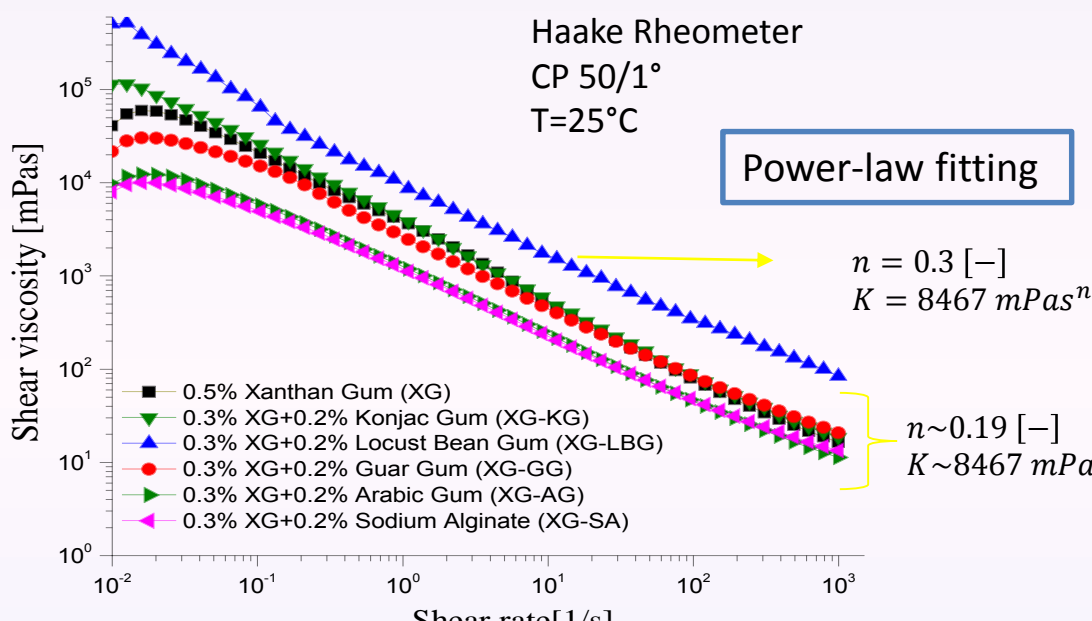


Figure 3. Flow curve of gum-based binary mixture

### Shear rheology

Strong gel effect of XG-LBG is pointed out in the Flow Curve (Fig. 3) and SAOS (Fig. 4a).

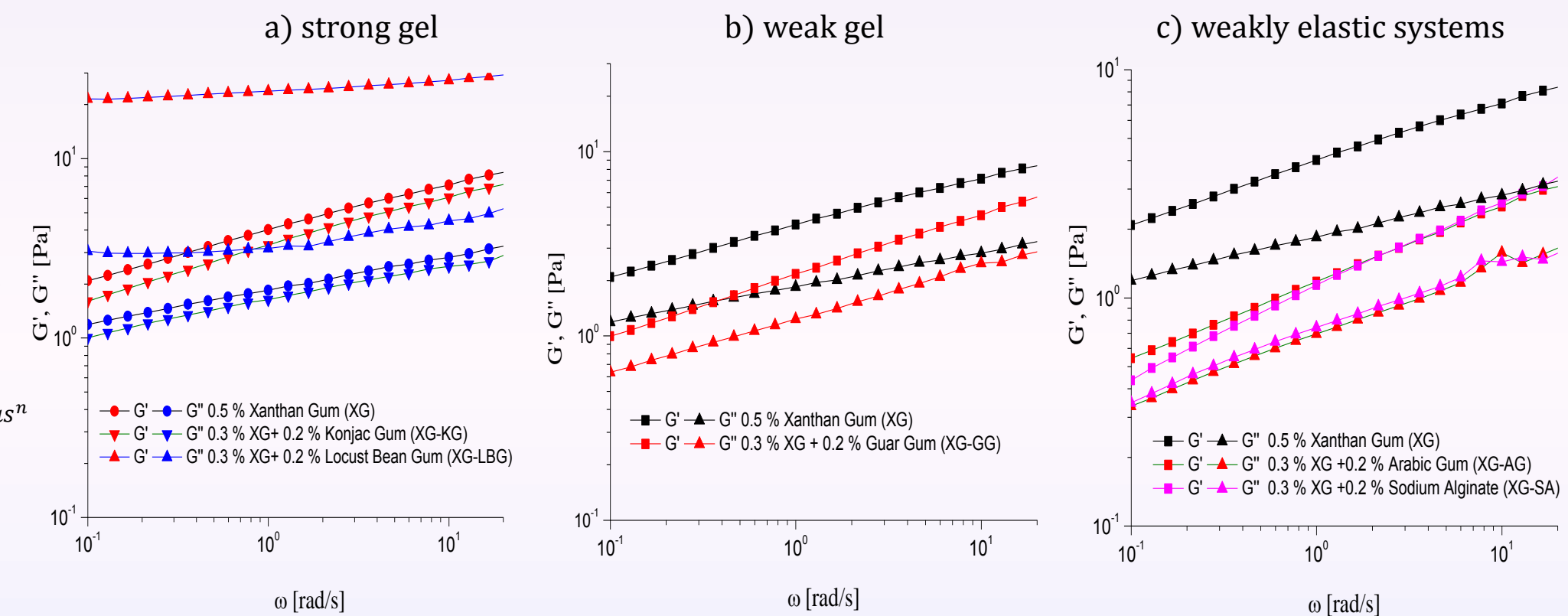


Figure 4. SAOS results of gum-based binary mixtures.

## TERNARY MIXTURES

Addition of starch leads to strong differences in extensional rheology in comparison to shear (Fig. 5)

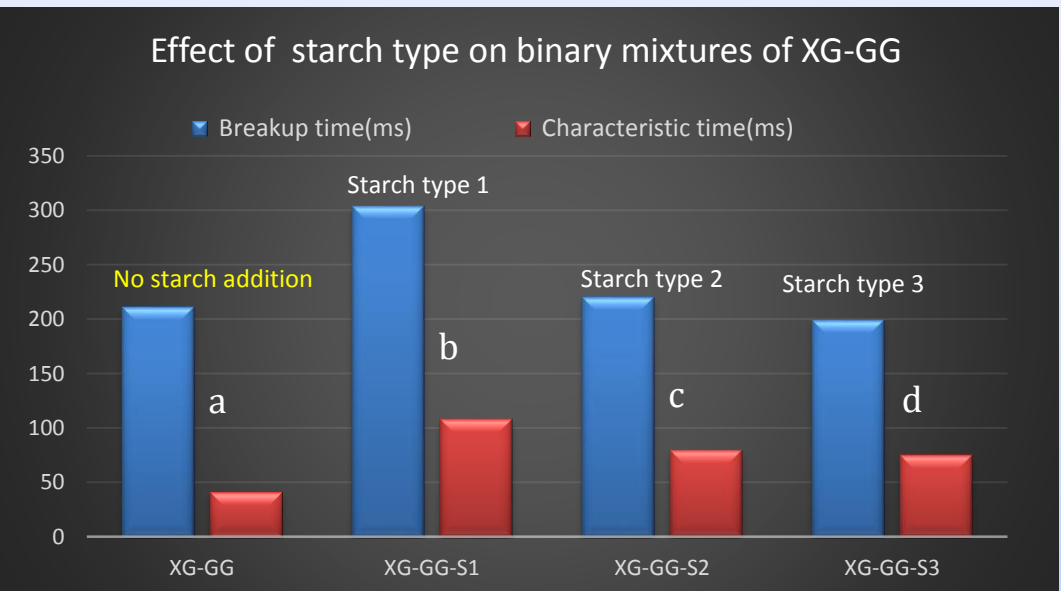


Figure 5. Elongational behaviour (a) and Flow curve (b) for ternary mixtures of XG-GG with different types of starches.

## EFFECT OF ALPHA-AMYLASE

Characteristic time allow to differentiate the effect of alpha amylase on diff types of Starches (Fig. 6)

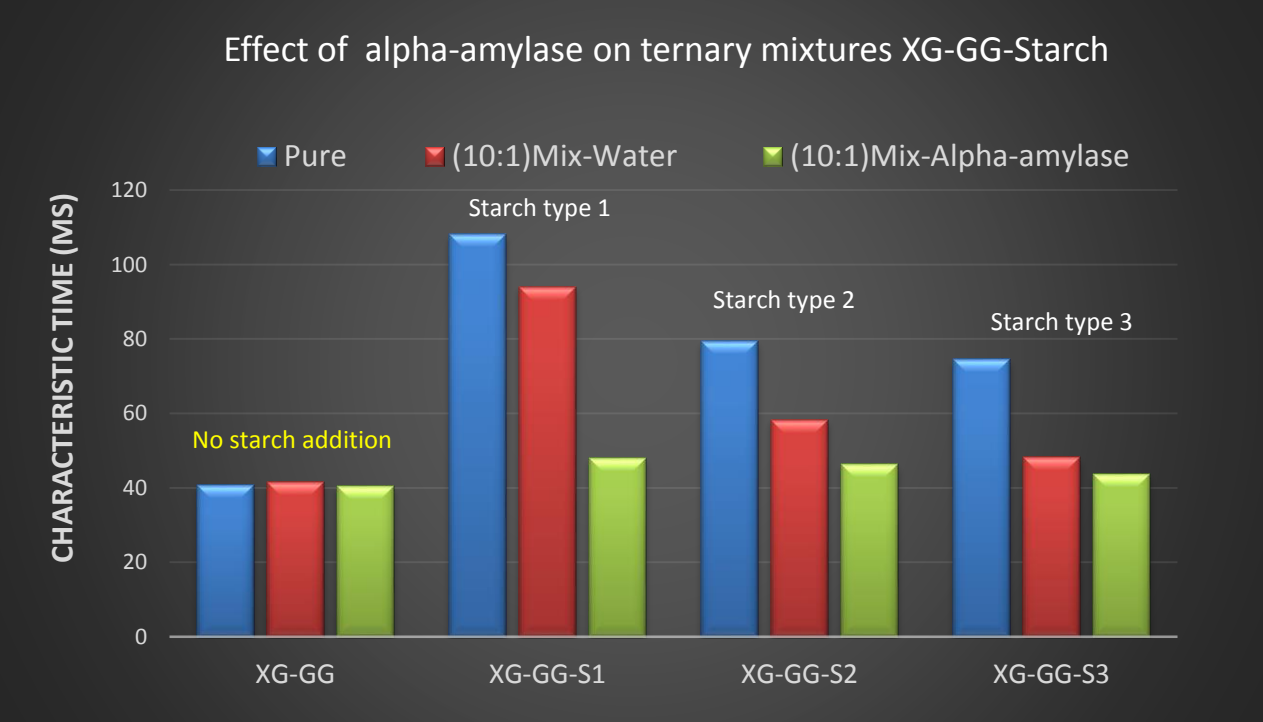


Figure 6. Characteristic time of ternary mixtures in presence of alpha-amylase

... but alpha-amylase is not saliva

Alpha-amylase solutions show almost no elongational properties compared to real human saliva (Fig 7.)

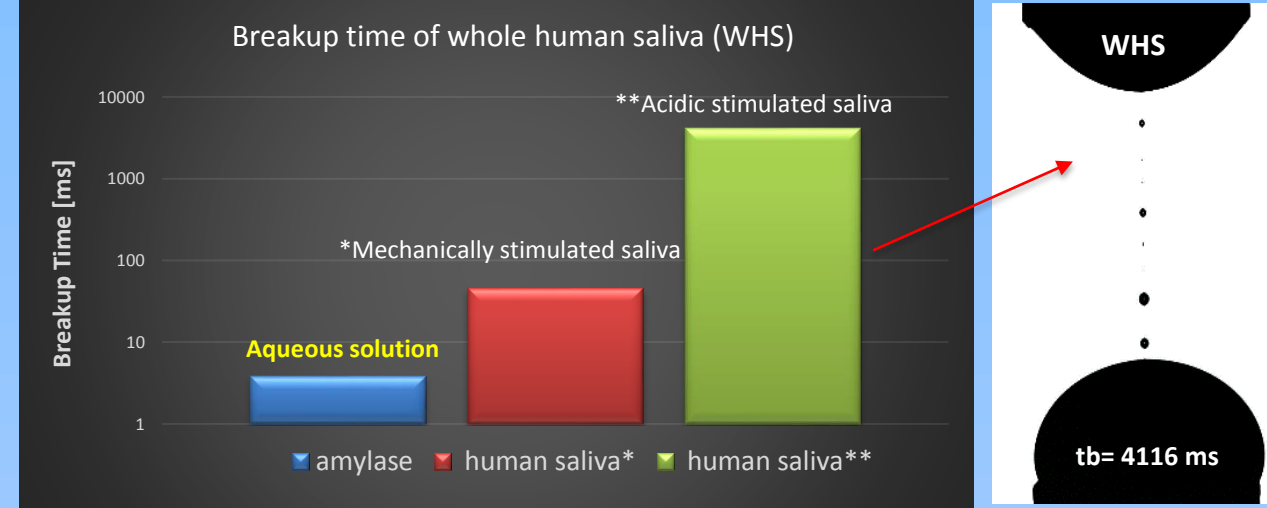


Figure 7. Breakup time of human saliva compared to alpha-amylase

## CONCLUSIONS

### Capillary break-up rheometry

- ✓ useful tool to differentiate samples with similar behaviour in shear
- ✓ fast way to study the synergistic effect of gums
- ✓ good indexer for ternary mixtures
- ☒ limited for highly structured systems