

# Evaluation of amylase-resistant Gellan Gum (E418) as a rheology and texture modifier for oral preparations

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## Background

Gellan gum (E418, CAS 71010-52-1) is a polysaccharide from brown algae (*Sphingomonas* [formerly *Pseudomonas*] *elodea*) with  $\beta$  1→4 type tetrasaccharide repeats cross-linked by  $\alpha$  1→3 glycosidic bonds. Due to these non  $\alpha$  1→4 type linkages, E418 is suitable for gel preparations which bear low aspiration risks for special patient groups, notably dysphagia patients.

## Objectives

The aim of this work was:

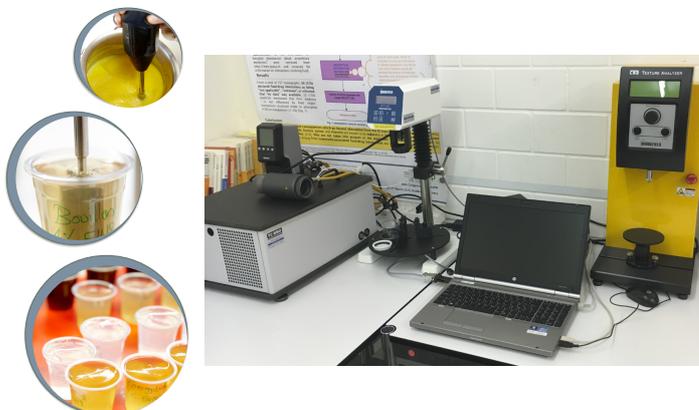
- ❖ To quantify the rheological and texture modification of E418 as a function of concentration, pH, conductivity, and temperature.
- ❖ To elucidate the complex material behaviour of E418 semisolids in view of their application for the dysphagia patients.

## Material and methods

Aqueous semisolids of E418 (Gelzan® Sigma Aldrich G1910) were prepared at concentrations between 0.1 - 2.0% (m/m) and at temperatures between 50 - 90°C. Viscosities were measured at the yield point using a Brookfield R/S+® Rheometer equipped with a Vane spindle 30/15. Textures were measured on a Brookfield CT3 TexturePro® Analyzer using the TA15/1000 30 mm D, 45 cone at a penetration depth of 20 mm.

## Results

- ❖ E418 remains tasteless below 2% (m/m) concentration. Excessive heat, extreme pH and low ionic strength have a negative impact on gelification.
- ❖ Tap water is suitable for E418 preparations.
- ❖ Temperature of no more than 70°C is a compromise between hydration (solubilisation) and degradation of E418. pH<3 is incompatible with E418.
- ❖ Using tap water of 0.512 mS/cm and 18 °fH, gel viscosity increases linearly with raising E418 concentration from 220 mPa\*s at 0.1% (m/m) to 6044 mPa\*s at 2% (m/m) with least square line  $y = 2905x - 289$  ( $r = 0.98$ ). (Fig.1)
- ❖ Hard tap water of 0.519 mS/cm and 27 °fH yields a calibration line of  $y = 11129x - 206$  ( $r = 0.995$ ). (Fig.1) Its texture increases polynomially from 149 g at 0.5% to 430 g at 1.5 % with  $y = 89x^2 + 124x$  ( $r = 0.93$ ) respectively. (Fig.2)



Pict.1: Equipment used for the rheological profiling of semi-solid preparation for dysphagia patients.

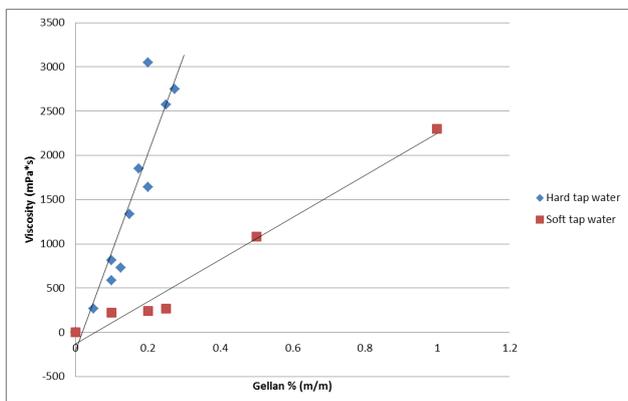


Fig.1: Viscosity of Gellan semi-solids depends linearly on the water hardness and gellan concentration

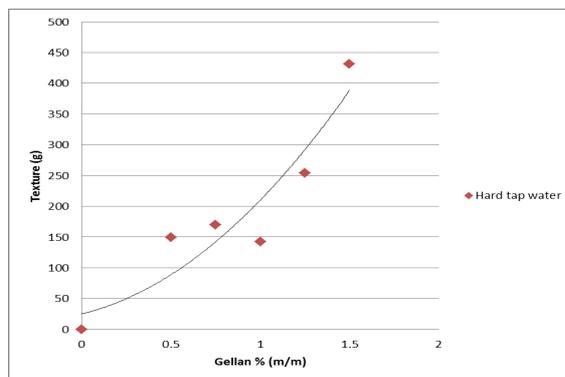


Fig.2: Texture depends polynomially on the gellan concentration

## Acknowledgements

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## Conclusion

E418 semisolids need a standardized preparation method to bring viscosity in a predefined range. A correlation line specific for the tap water source helps to find an individually optimised E418 concentration for special patients such as those suffering from swallowing diseases.