CENTRE OF BIOLOGICAL ENGINEERING



Evaluation of process conditions in bigels production: a multivariate analysis LH Fasolin and AA Vicente

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Introduction

 Bigels
 Complex biphasic gels
 To our knowledge there are

 Organogel and hydrogel
 no papers evaluating the

 Vehicle for hydrophilic and lipophilic compounds
 effects of process conditions

 Food, pharmaceutical and cosmetic applications
 on their properties

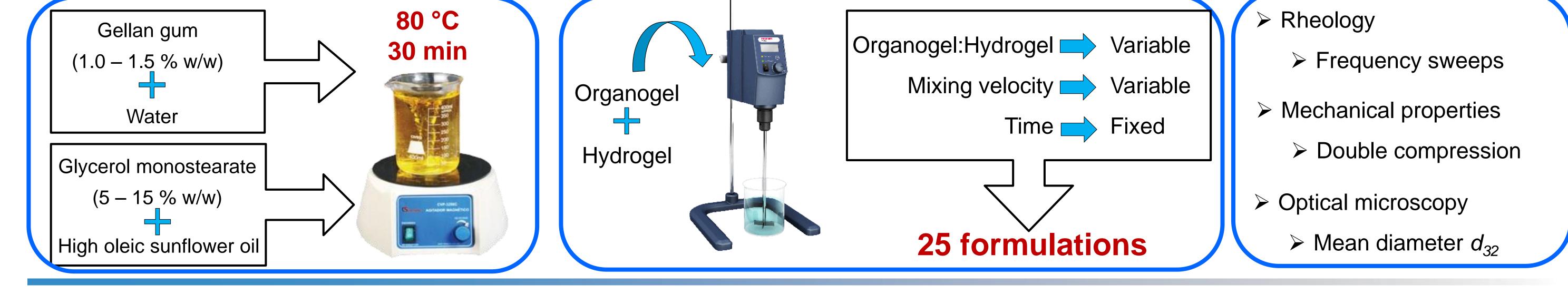
The aim of this work was the evaluation of the influence of process variables on physicochemical properties of bigels through multivariate analysis (PCA)

Methods

Organogel and Hydrogel preparation

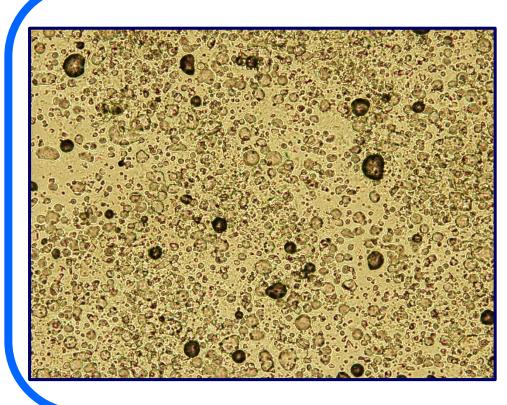
Bigel preparation

Analysis



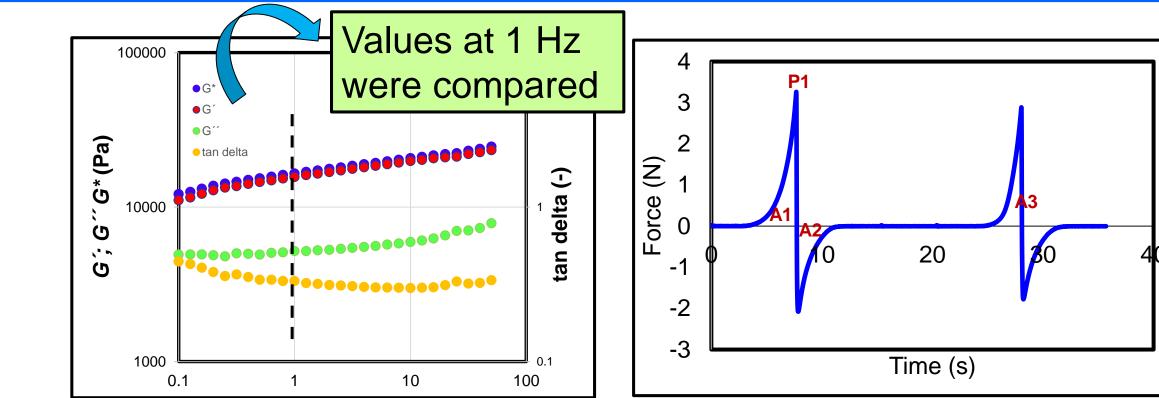
Results

Patterns obtained

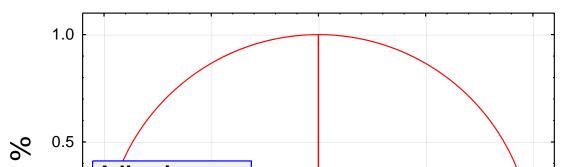


- Water-in-oil bigels
- Hydrogel particles
- Organogel

continuous medium



- Spreadability: First peak (P1)
- > Consistency: First positive area (A1)
- Adhesiveness: First negative area (A2)
- Cohesiveness: A3/A1 ratio



Mutivariate analysis (PCA) **℅**^{0.5} Adhesiveness 4.5, **G*** \sim Spreadability Lactor -0.5 Diameter □ Two factors were sufficient to explain 85.6 % of the Cohesiveness Consistency [•] Organogel ratio 2.5 variance Sample 19 Synergistic effects Tan delta -1.0 Sample 6 \Box Spreadability, consistency and G* are positively correlated, 1.5 Sample 5 \$ample 14 % Factor 1 : 71.11% Sample 13 Sample 9 Sample 22 1.0 They are opposed to diameter, cohesiveness and $\overline{}$ Sample 2 Sample 23 Sample 7 Hydrogel ratio 4 Sample 16 Sample 15 adhesiveness Sample 10 Sample 8 Sample 24 Sample 1 0.0 \sim Sample 4 Organogel ratio Horizontal axis corresponds to Organogel:Hydrogel ratio Factor -0.5 Sample 3 Sample 17 Organogelator concentration Crganogel ratio more structured systems Sample 12 Samp 25 -1.0 Sample 21 Sample 11 Sample 18 $\subseteq G^*$, Spreadability and consistency -1.5 Sample 20 Organogelator concentration 50:50 organogel:hydrogel ratio Vertical axis corresponds to mixing velocity Hydrogel concentration Organogelator concentration Interactions among parameters evaluated Velocity 2 Medium velocity Synergistic effects Factor 1: 71.11%

Conclusions

□ Organogel:Hydrogel ratio was the parameter that exerted more influence on bigels' production process

□ Different physicochemical properties can be obtained by tuning the parameters involved in the bigels' production process

Softer or harder gels, with higher or lower spreadability, bigger or smaller particle size can be produced, depending on the desired final product and application

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