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Storage and flavor influence on the rheological properties of handmade mayonnaises

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1 Introduction

Mayonnaise is the most popular sauce in the world. It is characterized as a type of semi-solid emulsion of oil in water that traditionally contains about 70 to 80% of oil. It is also contains an organic acid (acetic or citric) that lows the pH, which is stabilized with the addition of glycophospholipids, lipoproteins and egg proteins (5-10%) acting as emulsifiers (Harrison, 1985). Generally, the rheological stability of a mayonnaise depends upon numerous factors such as oil and egg content, viscosity, relative volume of oil phase in the aqueous phase, mixing method, water quality and temperature of storage (Kaneda and Takahashi, 2013). The variety of flavors may interfere with the emulsion formation and stability as well as the time stored in the supermarket´s shelf.
The aim of this study was to evaluate the storage of two different flavor types of handmade mayonnaise through their rheological properties.

2 Materials

Two commercial handmade mayonnaises produced by Maionese D'Casa (Bom Jesus do Itabapoana, RJ), traditional and black olive, were used.

2.1 Methods

The rheological analysis were conducted on a oscillatory rheometer MARS (Thermo Haake, Karlsruhe, Germany) in the viscoelastic region determined by amplitude sweep, which was performed under a strain range from 0,1 to 200 Pa at a constant frequency of 1 Hz following the methodology described by Bengoechea et al. (2009) using plate-plate sensor of 35 mm, whereas the oscillatory test was performed at frequency rate from 1 to 100 Hz and constant strain of 3 Pa using a cone-plate (2º) sensor with a diameter of 35 mm. The oscillatory tests were conducted once a week to follow the changes of structural stability at room temperature (25ºC).

3 Results and discussion

A small amplitude experiment carried within the linear viscoelastic region, on the other hand, has an advantage of minimizing destruction in the sample since little or no permanent structure breakdown occurs during the dynamic measurements. This approach allowed drawing a relationship between the results obtained and the actual structure of material to be drawn.

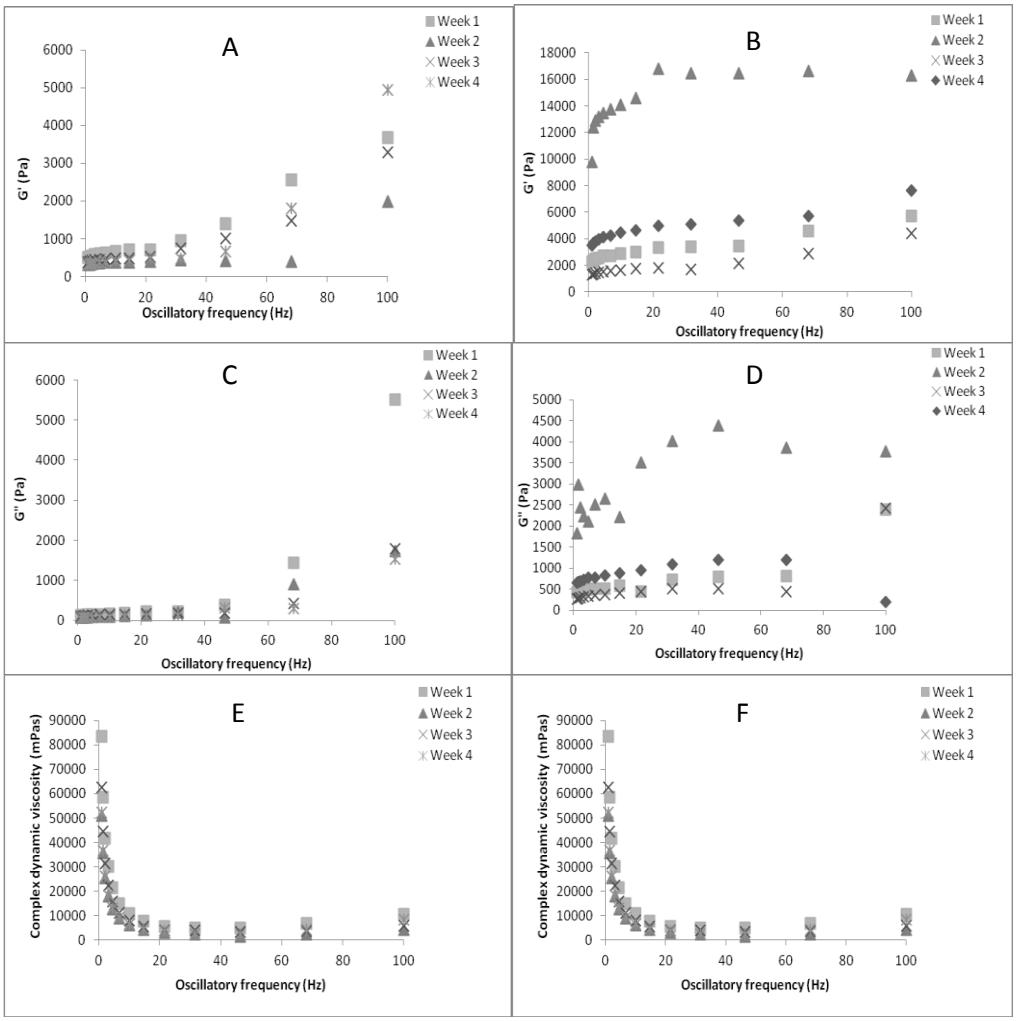

Figure 1. Dynamic test of two handmade mayonaise flavors**. A.** storage modulus (G') as a function of oscillatory frequency of conventional mayonnaise, **B.** G' as a function of oscillatory frequency of olive mayonnaise, **C**. lost modulus **(G")** as a function of oscillatory frequency of conventional mayonnaise, **D**. G" as a function of oscillatory frequency of olive mayonnaise, **E.** Complex dynamic viscosity as a function of oscillatory frequency of conventional mayonnaise, **F.** Complex dynamic viscosity as a function of oscillatory frequency of olive mayonnaise

The results of the rheological analyses showed a decrease in the complex dynamic viscosity and in the viscoelastic modules (storage module, G' and lost module, G"), as a function of time, except for the black olive mayonnaise stored for two weeks, as showed in Figure 1.
Concerning the oscillatory test, the values of the viscoelastic modules and the complex dynamic viscosity of olive mayonnaise were much higher for black olive flavor than those values of traditional mayonnaise. In general, black olive mayonnaise exhibited a weaker-gel type when compared to the traditional flavor, since G' (elastic module) was higher than G" (loss module). This behavior is usually expected for emulsions with greater fat content and a more compact structure, although there is no confirmation that fat content was higher for the black olive mayonnaise, at least, not expressed on the packing label. It is possible tough, that this difference should be attributed to the presence of visible olive particulates dispersed in the homogenous phase matrix of the emulsion.
In general, the complex dynamic viscosity reduced with time, which was observed for both mayonnaise flavors in all frequencies. However, this drop in viscosity was not substantial and, probably, it would be not noticed by the consumer.

4 Conclusion

The rheology of this type of food showed to be an interesting tool to evaluate the stability of handmade mayonnaises along time and also to predict the mouthfeel, however the association of sensorial analysis and rheology studies would be an interesting approach.
The addition of black olive particulates clearly increased the viscosity of the mayonnaise as a result of increasing the density of the emulsion.

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6 References

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