Stability of whipped egg

Application
Food

Objective
Study the various process of destabilitisation of whipped egg

Device
TURBISCAN® Classic

INTRODUCTION

Eggs, and more specifically whipped egg, are basic ingredients of the food industry as they enter in the composition of various recipes such as pastries, soufflé, sponge cake, *etc*. Whipped egg is made by whipping the egg white allowing the incorporation of air, hence the formation of a dispersion of air bubbles in the aqueous phase of the egg white, stabilised by proteins. The stability of the foam is a critical parameter regarding the stability of the final product.
The study of the stability of whipped egg is therefore an important parameter for the stability study of the prepared food. The kinetics of coalescence of the air bubbles and the potential syneresis need therefore to be controlled.

The Turbiscan Classic can be used to study the stability of foam in general and therefore, can be used to characterise the stability of whipped egg.

METHOD

Three types of egg white are used to carry out this experiment.

- An egg white separated industrially and thermally treated (UHT). It contains some xanthane to compensate the loss of viscosity of the product.
- Some egg white separated in the lab, coming from two brands of egg.

The egg white have been whipped using the same protocol (time, temperature, speed of the whipping) and the sampling has been carried out in the Turbiscan Classic cells by coring. The stability has been followed on one hour.

RESULTS

1. Determination of the syneresis

The characterisation of the syneresis of whipped egg is done very easily using the Turbiscan Classic as a peak in transmission appears (Figure 1). It is therefore possible to calculate the kinetics of syneresis by following the thickness of the transmission peak (Figure 2).

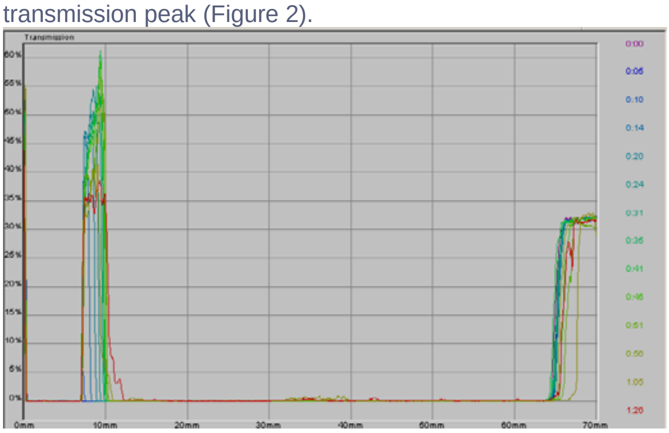

Figure 1. Signal in transmission

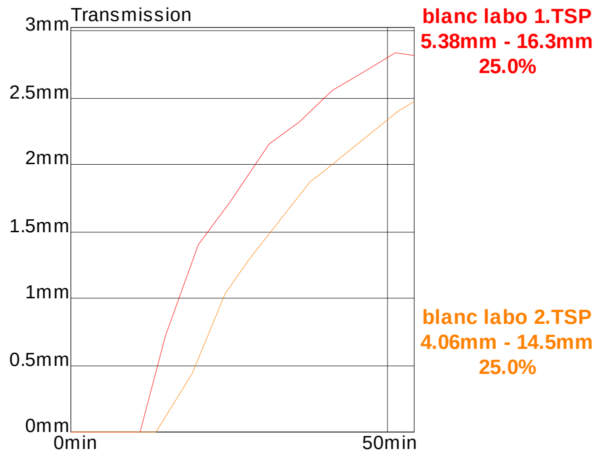

Figure 2. Kinetics of syneresis

We can see on this graph that the industrial egg white does not lead to any syneresis after one hour, which can be due to the presence of xanthane and/or the modification of the physico-chemical properties of the proteins due to the thermal treatment. The two egg white separated in the lab (type 3 and 5) show some syneresis, which varies with the type of egg. This is not surprising as we can easily imagine that different eggs do not have the same composition in proteins stabilising the air bubbles.

2. Coalescence of air bubbles

The stability of egg white is determined by following the evolution of the backscattering flux in the middle of the sample, enabling to get the kinetics of coalescence of the air bubbles (Figure 3). It is therefore very easy to compare different whipped eggs (Figure 4).

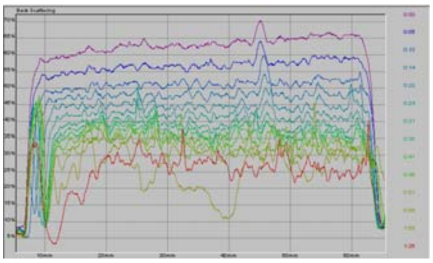

Figure 3. Raw data in backscattering

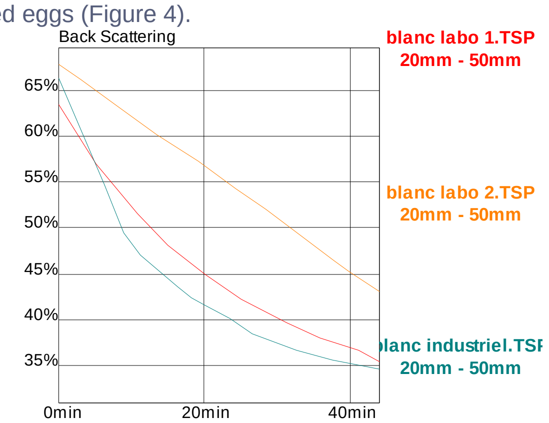

Figure 4. Kinetics of coalescence of air bubbles

We can observe, Figure 3, that in addition of the decrease of backscattering level characteristic of the coalescence of the air bubbles, the signal becomes more and more noisy. This is due to a ripening of the air bubbles (small bubbles empty in the big ones) leading to an heterogeneity of the system (polydispersity of the air bubbles). Moreover we can observe that the presence of xanthane does not slow down the kinetics of coalescence of the air bubbles.

Therefore we can see that the syneresis is not directly linked to the stability of the whipped egg, as the xanthane prevents the syneresis, probably by thickening the aqueous phase, but does not stop the ripening and the coalescence of the air bubble, which seem to be linked to the quantity and the state of the proteins in the egg white.

SUMMARY

The Turbiscan Classic enables to follow the stability of whipped egg, critical parameter in the stability of food.