Study of the quick breaking of a foam

Quick and simple foam characterisation

Application
Cosmetics

Objective
Characterization of a hair foam and its breaking

Device
TURBISCAN® LAB

INTRODUCTION

Foams can be assimilated to gas in liquid emulsions. They are very unstable products and their life span does not exceed the few minutes of its application. In the case of hair foams, the breaking of the product has to be quick to enable an easy application. Therefore the kinetics of breaking is a fundamental parameter for the formulator. However, this characterization is very difficult to perform due to the rapidity of the phenomenon.
With using the Turbiscan LAB in the « fixed position » it is possible to study the kinetics of breaking of such products.

METHOD

We analyse an on sale hair foam using the Turbiscan LAB with the “fixed position” mode: the apparatus reading head makes a measurement every 0.5 second at 10 mm from the tube bottom (no scan) to be able to track this quick foam breaking phenomenon.
The first results we get are backscattering intensities versus time.

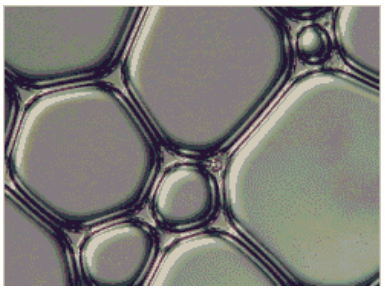
We let the foam break until the process ends: we obtain the liquid phase and can determine its refractive index (using a refractometer). Moreover, as we measure the initial sample volume and the final liquid volume (when no more air is dispersed in the continuous phase), we can determine the air volume fraction in the foam.

RESULTS

1. Analysis of the bubbles diameter

From backscattering measurements, the Turbiscan LAB^{expert} calculates the bubbles mean diameter. The values to enter in the software to make this calculation are :

- Refractive index of the continuous phase n_p = 1.339 (measured on the liquid phase when the foam is completely “broken”)
- Refractive index of the dispersed phase n_f = 1 (air)
- Volume fraction of the dispersed phase ϕ = 96 % (calculated with the initial sample volume and the final liquid volume when the foam is broken)



Foam picture by optical microscopy

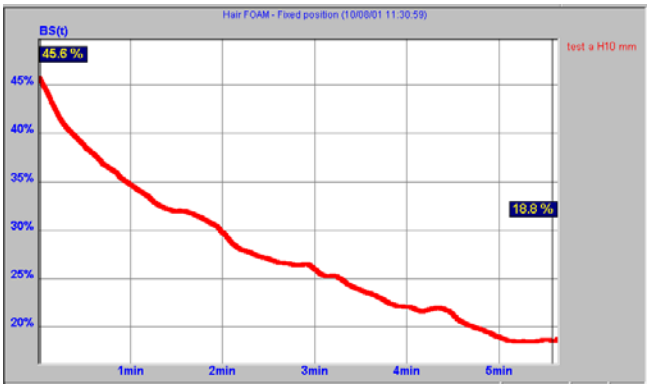


Figure 1. Backscattering versus time