APPLICATION NOTE

CONTROL OF A MAYONNAISE STABILITY

Mayonnaises are usually oil in water emulsions (O/W) with a high ratio of internal phase (oil). These products have relatively short shelf lives and show typical colloidal instabilities (creaming, coalescence, …). Therefore, it is important to test their stability in the less time possible in order to increase the delivery period from the development to the production and, by doing so, follow the expectations of the consumers in the most efficient way.

Application 1: Control of the raw materials.

× **Common method:**

Controlling the quality of raw materials (flavours, stabilisers, gums, *etc.*) for mayonnaise is of prime importance for both the raw material supplier and the food industry because of the sensitivity of these products towards stability. Therefore, tests have to be performed to ensure the quality of the raw materials. These tests are usually done by preparing reference emulsions (standard emulsion with only the raw material to test changing) and testing their stability visually over several weeks.

The quality control of raw materials can therefore take a few days, holding back the distribution of the batches.

× **Turbiscan® method:**

The Turbiscan LA*b* enables to accelerate stability tests of emulsions prepared with the same standard method as previously mentioned. The equipment also gives the possibility to draw kinetics of instability (migration or particle size variation) and therefore to compare easily newly produced batches to reference values. The thermoregulation (from 4 to 60°C) enables to accelerate the tests even more.

Using the Turbiscan LA*b*, the control tests of raw materials are accelerated up to 50 times, enabling to increase the production capacity and to improve the reliability of the products.

Application 2: Development of a new mayonnaise.

× **Common method:**

When developing a new product, the formulator has a list of specifications from the marketing that he needs to fulfil, with all the physico-chemical issues that can arise with mixing different kind of raw materials. Because of the large complexity of the systems, the most widely spread method to measure the stability of food product is the visual observation of the samples at different temperatures during several months. However, this is a very subjective and tedious test that leads to long delivery time of new products.

× **Turbiscan® method:**

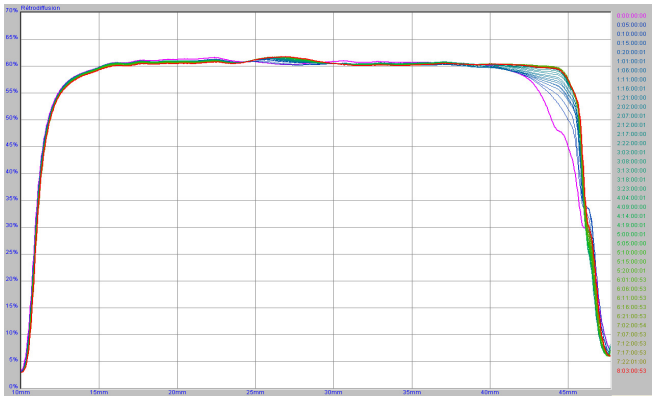
The Turbiscan LA*b* enables to identify and monitor the stability of colloidal dispersions in only a few days. It is a very helpful tool for the formulator as it gives a real insight on the instability taking place (migration and/or particle size increase) and enables to quantify it through parameters such as migration velocity and flocculation rate. It then becomes easier to test the effect of different ingredients, stabilisers and obtain the most robust and stable formulation in less time.

The Turbiscan LA*b* enables a quick and objective measurement of the stability of mayonnaise-like products, shortening significantly the development time of new products.

APPLICATION NOTE

Application Example: Mayonnaise stability

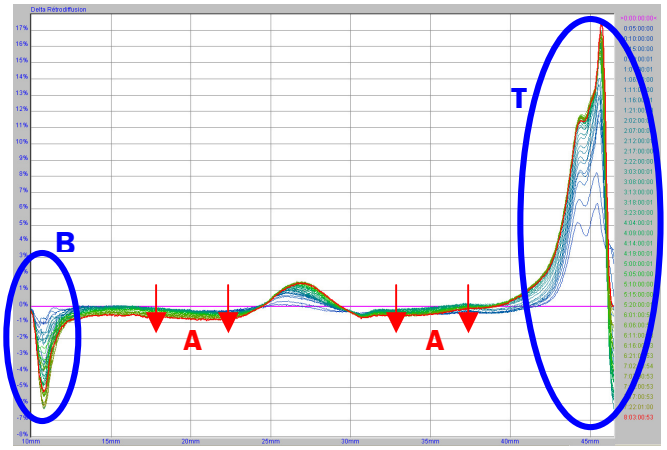
× **Backscattering profile:**



The evolution of backscattered signal is directly linked (for a given temperature) to the size and concentration of dispersed particles.
This enables to monitor the migration and size variation of the particles during an ageing process.

In this example, a sample of mayonnaise has been studied during 8 days at a temperature of 40°C.

× **Backscattering evolution, identification of the phenomena:**

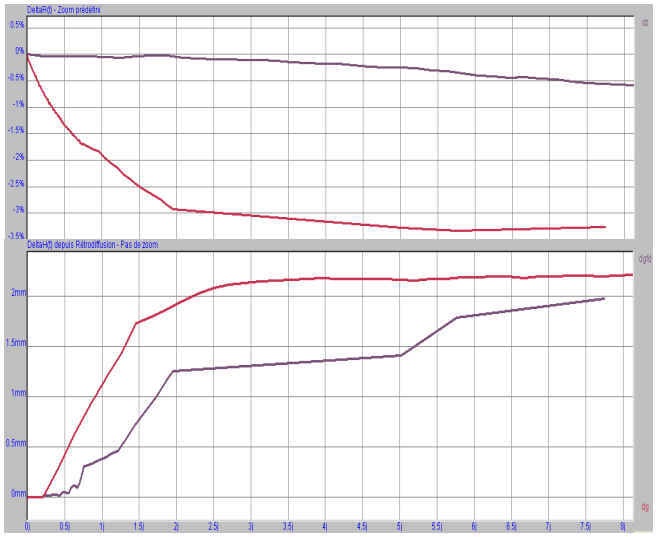


Two phenomena can be detected in this analysis:

- Slight variation of the backscattered signal in the center of the sample (see A in the graph). This decrease of the signal is typical of the size variation of the droplets in the emulsion → ***coalescence***.

- Peaks at the extremities of the sample (see B and T on the graph, for bottom and top). These peaks are typical of a migration of the dispersed particles in the sample toward the bottom of the product. (less and less droplets at the bottom of the mayonnaise, more and more at the top of it)
→ ***creaming***.

× **Characterization and quantification of the phenomena, comparison of several samples:**



In order to characterize and quantify the phenomena occurring in this mayonnaise, it is possible to compute different parameters:

- Variation of the backscattered signal intensity in the center of the sample. It is directly related to the size variation of the droplets, and this way it allows to compare the kinetics of coalescence of different samples (see upper part of the graph, pink curve, purple curve is another mayonnaise for comparison). Knowing the refractive indexes of the phases, it is possible to access the mean diameter of the droplets.
- Clarified layer height. It allows the user to directly know the thickness of the oil layer which is forming at the top of its product during the analysis (see lower part of the graph, pink curve, purple curve is another mayonnaise for comparison).

Characterization and comparison of several samples is allowed thanks to the Turbiscan, identifying and quantifying the different phenomena occurring in the studied mayonnaises.
Turbiscan gives access to information such as kinetics of coalescence of the oil droplets, evolution of the mean diameter of the droplets, and height of oil layer forming at the top of the samples during the ageing process.