TURBISCAN

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Food

STABILITY OF VARIOUS BEVERAGE EMULSIONS

Abstract

Beverage emulsions are very common on the market as they comprise all dairy based drinks and many of the soft drinks, which are diluted emulsions. All of these products show typical colloidal instabilities (creaming, sedimentation, flocculation, coalescence). Therefore, it is important to test their stability in the less possible time in order to improve the delivery period from the development to the production and, by doing so, follow the expectations of the consumers in the most efficient way. All these destabilizations can be monitored and quantified using the Turbiscan LAB or Classic. Analyses are done on the real product, without dilution and can be accelerated through temperature increase and automated with the ageing station (Turbiscan ags).

Keywords: milk, soft drink, emulsion, stability, Turbiscan®.

Introduction

The food industry develops more and more beverage based on emulsions. These can be originated from milk, with many different variations depending on the application required: different flavours from the old chocolate milk to the new fashionable mixtures of milk and juice; different additives giving milk enriched in vitamins, calcium, minerals for healthy drinks; *etc*. However, addition of these different raw materials into an already metastable colloidal product, which is milk, leads to important instabilities needed to be solved by the formulator.

On the other hand, many soft drinks are made from concentrated emulsions, which are diluted in aqueous solutions in order to simplify the production and reduce the supply chain cost as much as possible. However, here again colloidal instabilities arise and need to be controlled in order to ensure good quality products.

In addition to these physico-chemical problems, the formulator has to develop more and more new products in order to satisfy the consumers' requirements for new tastes. To be able to follow this challenge in a very competitive market, he needs to develop good quality drinks in the shortest possible time.

In this paper, we propose a unique tool, the Turbiscan®, to help the formulator in his day-to-day job of identifying and monitoring instabilities. Various behaviours of beverage emulsions are described as they are shown with the Turbiscan®.

Experimental procedure

1. Principle of the measurement

The heart of the optical scanning analyser, Turbiscan®, is a detection head, which moves up and down along a flat-bottom cylindrical glass cell (Figure 1)[1-2]. The detection head is composed of a pulsed near infrared light source (λ = 880 nm) and two synchronous detectors. The transmission detector (at 180°) receives the light, which goes through the sample, while the backscattering detector (at 45°) receives the light scattered backward by the sample. The detection head scans the entire height of the sample, acquiring transmission and backscattering data every 40 µm. The Turbiscan LAB can be thermo-regulated from 4 to 60°C and linked to a fully automated ageing station (Turbiscan ags) for long-term stability analyses. Increasing temperature is the ideal parameter to accelerate destabilisation processes, while maintaining realistic testing conditions.

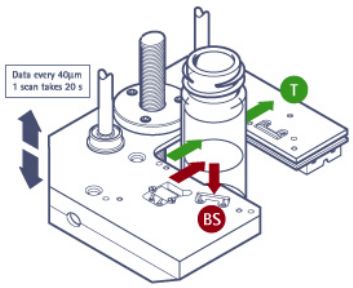

Figure 1. Principle of Turbiscan® measurement

The Turbiscan® makes scans at various pre-programmed times and overlays the profiles on one graph in order to show the destabilisation. Graphs are usually displayed in reference mode, whereby the first profile is subtracted to all other profiles, in order to enhance variations. A stable product has all the profiles overlaid on one curve (Figure 2), as an unstable formulation shows variations of the profiles (Figure 3). Backscattering and/or