



Method to measure the concentration profile during destabilization

RAW MATERIALS

Introduction

The study of the concentration profile of a suspension or emulsion is of great interest for various fields like coating, inks, pharmaceutical applications, cosmetic...In fact, those profiles allow the users to assess information regarding their products like the capability to deliver the same quantity of an active ingredient over time (i.e. pharmaceutical application) or to avoid the creation of a highly concentrated sediment in ink industries. Using a calibration curve, the Turbiscan® technology gives access to a concentration profile versus the height of the samples over time.

KEY BENEFITS

FAST

NO DILUTION

SENSITIVE

In this note, we propose a method to generate this concentration profile for nano-silver ink.

(Reference: "Particle Inks for Inkjet Printing of Electronic Components", U. Currie, International conference on digital Printing Technologies, 2008, 702-706).

Reminder of the technique

Turbiscan® technology is based on Static Multiple Light Scattering which consists of sending a light source (880 nm) into a sample and acquiring a backscattered (BS) and transmitted (T) signal over the height of a sample. Combining both detectors enables analysis of samples over a wide concentration range.

The signal is directly linked to the particle concentration (ϕ) according to the Mie theory:

$$\phi = f(BS, d, n_p, n_f)$$

Concentration profile method

The concentration profile can be displayed on a graph where the weight percentage (wt%) is plotted against the percentage of sample height as shown in Figure 1 for a creaming sample.

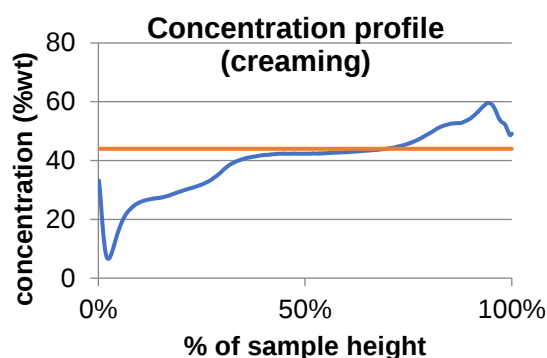


Figure 1: Concentration profile versus sample height

For both case studies, the same protocol was used to generate the concentration profile:

1. Calibration curve: Using known calibration standards, a graph of backscattering intensity versus concentration was generated
2. Turbiscan® measurement: Unknown samples are analyzed using the Turbiscan® technology
3. Concentration profile: Using the calibration curve and the measurement of the unknown sample, the concentration of active ingredient versus the sample height was generated.