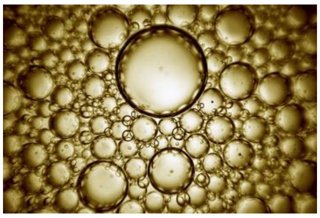

CHARACTERIZATION OF AN EMULSION (STABILITY AND SIZE)

INTRODUCTION

Emulsions are colloidal systems commonly used in the cosmetics industry. There are inherently unstable but can be considered as kinetically stable if their destabilization is slower than their expected shelf life. Moreover, in order to sell these products, it is necessary to characterize them and control their quality.

The advantage of the Turbiscan™ technology is that it does not require any dilution and so samples can be characterized as they are. In this application note, the particle size and stability properties are analyzed.

PRINCIPLE

Measurement with Turbiscan®

Turbiscan instrument, based on Static Multiple Ligh Scattering, consists in sending a light source (880 nm) on a sample and acquiring backscattered and transmitted signal. Combining both detectors (BS & T) enables to reach wider concentration range. The backward reflected light comes from multiple scattering as the photons scatter several times on different particles (or drop).

This signal intensity is directly linked to the diameter (d), according to the Mie theory:

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

More information

METHOD

We analyzed four direct emulsions of canola seed oil in water with different volume fractions of oil (10%, 20%, 30% and 40%) using the Turbiscan™.

These emulsions are stabilized with a mix of SDS and Span 80.

Using the Turbiscan™ the destabilization process was monitor by scanning the sample every 30 seconds during 1 hour

RESULTS

The different emulsions are characterized by measuring:

- Size of the oil droplets (at t=0)
- The global stability (TSI)
- Migration rate of the droplets

1- Raw emulsion characterization (particle size)

All four emulsions are analyzed using the Turbiscan™ Lab, the following graph is generated:

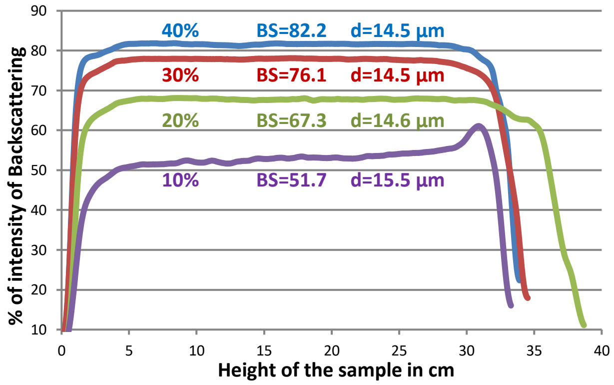

Figure 1: % of Backscattering versus the height for all conc.

The graph in Figure 1 represents the initial level of backscattering for the four emulsions concentrations.

The Turbiscan enables the computation of the mean diameter of the droplets according to the Mie theory law and by using the following parameters:

- Refractive index of the dispersed phase np = 1.471
- Refractive index of the continuous phase nf = 1.33 (water)
- Volume fraction of the dispersed phase ϕ = 10 - 40 %

Concentration of oil (%)	% of Backscattering	Mean diameter (µm)
10	51.7	15.5
20	67.3	14.6
30	76.1	14.5
40	82.2	14.5

Table 1: % of BS and mean diameter for all samples

Thanks to the previous table, we can conclude:

- The concentration of oil doesn't impact the mean diameter of the droplets
- The mean diameter of oil droplets can be computed by measuring the intensity of an emulsion.