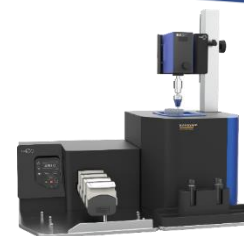


Pigment and fillers (Part 2)

- Automated dispersant efficiency screening -



KEY BENEFITS

ONLINE
NO DILUTION
FAST

Introduction

Suspensions are solid particle dispersed into a liquid phase. Due to the high energy of contact, dispersing solid particles remains a challenge and it is key to ensure final properties of the formulation. To ensure a good dispersibility, additives (known as dispersants) can be added to keep particles individually dispersed in liquid rather than allow agglomerates to form. Many questions need to be answered: Which dispersant is the most suited? What is the optimum concentration to ensure the best performance/cost ratio? What is the shelf life of the final formulation?

The Turbiscan®, the leading technology to measure the dispersion stability & shelf life, helps formulators in the decision-making process thanks to its “online” capabilities. This application papers shows how the Turbiscan® DNS with **TMIX** function, can help select the most appropriate dispersant for a TiO₂ suspension and to reach the most appropriate particle size.

How it works

Turbiscan® technology, based on Static Multiple light scattering (SMLS), consists on illuminating a sample with an infrared light source and acquiring backscattered (BS) and Transmitted (T) signals.

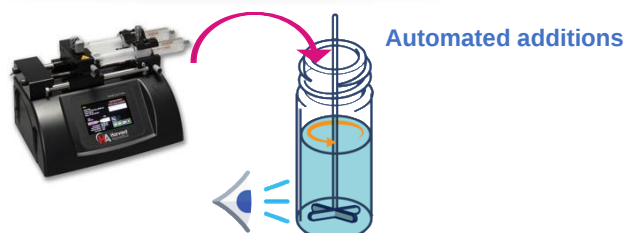
$$BS \text{ and } T = f(\phi, d, n_p, n_f)$$

The signal is directly linked to the particle's concentration (ϕ) and size (d) according to the Mie Theory, with refractive index of continuous (n_f) and dispersed phase (n_p) being fixed parameters. The measurement of the BS and T can be performed either on scanning mode, to provide homogeneity and stability measurement, or with very high frequency for fast time resolved and online measurement.

The measurements are done without any dilution & on native sample.

Additionally, the TURBISCAN DNS associates 2 function for online characterization of the dispersibility:

- Mixing function (TMIX) for automated fast formulation screening with a stirring bar directly inside the measurement cell. **Subject of this note.**
- Circulation function (TLOOP) for online measurements and scale up or process optimizations. (see Notes Flow 5-7).



Experiment and method set up

TiO₂ particles are prepared in pure water* at 0.5wt% and the dispersion is then placed in the Turbiscan DNS measurement cells equipped with **TMIX function**. Dispersant is automatically added to the dispersion using a syringe pump for controlled concentration screening. The process takes place under agitation at 2000 rpm.

Formulation screening: 3 dispersants have been selected (SDS, CTAB and Decylglucoside) with the aim to screen the concentration from 0% to 1.2%. The concentration of the dispersant is applied automatically via autonomous syringe pump. Thus, the measurement is fully automatic and only lasts 30 min per dispersant.

The measurements of BS and T are done:

- **Under agitation** and while changing the disperstant concentration.
- **At high frequency** (10 measurements/second) thanks to **T-Fast** software.
- Directly on the **native sample**, avoiding tedious and long sampling process present with other particle size technologies.

