

Pigments and fillers (Part 1)

- Fast and effective raw material screening -



Introduction

Choosing the correct raw materials for high quality formulation can be tedious and time consuming due to the wide variety of chemicals and alternatives (manufacturers, origins, eco-friendly...). The Turbiscan[®], leading technology to measure the dispersion stability, can be the decision maker thanks to its online capability to measure particle size with no dilution. This application papers shows how the Turbiscan[®] DNS, with its embedded mixing function helps select the most appropriate TiO₂ to reach the desired particle size.

KEY BENEFITS

ONLINE
NO DILUTION
FAST

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).



Automated or Manual additions

Experiment and method set up

Various types of TiO₂ have been studied with the aim to rapidly screen and select the most adapted powder to reach the targeted particle size.

Sample	Manufacturer	Primary* particle size
TiO ₂ _1	Pylote	250-300nm
TiO ₂ _2	Sygma Aldrich	250-300nm
TiO ₂ _3	Marion technology	250-300nm
TiO ₂ _4	Kronos 2190	250-300nm
TiO ₂ _5	Kronos 2971	250-300nm

* provided by the manufacturer

Samples are prepared at 0.5% wt in deionized water directly in the 20mL cylinder glass vial and placed in the Turbiscan. The TMIX is the mounted on the vial (dedicated cap and stirring blade to apply mixing placed directly inside the measurement vial).

The mixing rate is fixed at 2000 rpm and the measurement of the BS and T is started immediately with no delay and at high frequency (10 measurements/ second) for 30 min.

