EFFECT OF POLYMER ON PIGMENT DISPERSION

INTRODUCTION

To be able to offer a wide range of color for coating, different type of pigment are used. To insure a good cohesion between the different components and so optimize the properties of the coating in term of viscosity, polymers are added to the suspension. The aim of the polymer is to insure a good thixotropy (viscous at rest and fluid under stress) and insure a good adhesion to the support.

The concentration of polymer directly affects the stability and the viscosity of the formulations, consequently by adjusting the concentration, the thixotropy and the stability can be optimized.

The Turbiscan technology enables to monitor the stability of these dispersions as a function of the polymer concentration.

PRINCIPLE

Measurement with Turbiscan®

Turbiscan™ instrument, based on Static Multiple Light 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 concentration (φ), according to the Mie theory:

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

More Information

METHOD

In order to perform this study, suspension of phthalocyanin (aromatic macrocyclic pigments) are evaluated at 4 different concentrations of polymer.

Samples are analyzed using the Turbiscan technology during a period of 3 days at 25°C

RESULTS

To evaluate the impact of the concentration of polymer on the suspension stability, 3 different parameters are measured:

- The sedimentation rate of the pigments
- Concentration variation at the top of the sample
- The global stability (TSI)

1- Sedimentation rate of the pigments

Due to the migration of the pigment toward the bottom of the sample, we can observe in Figure 1, a decrease of the light itensity at the top of the sample (decrease of the concentration of pigments).

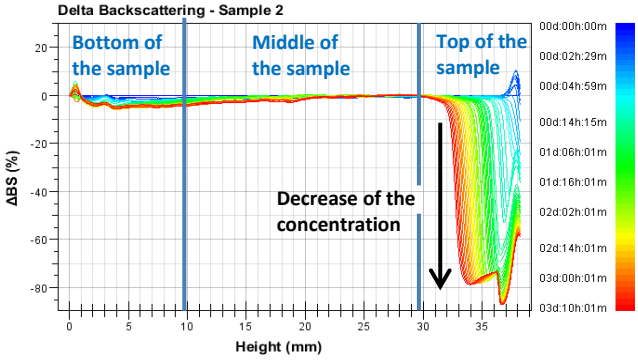

Figure 1: Variation of backscattering versus sample height

By measuring the thickness of the clear layer over the duration of the measurement (Figure 1), the migration rate of the pigment is computed (Figure 2)

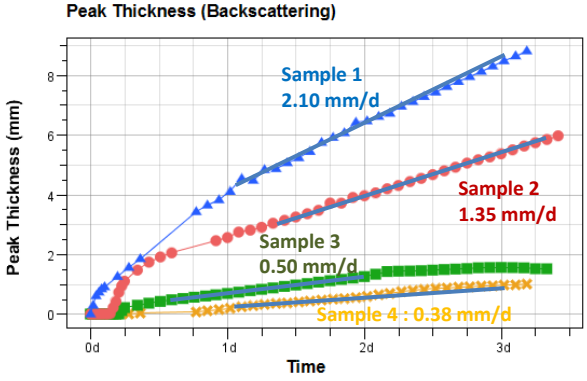

Figure 2: Sedimentation kinetics