

Stability of Transparent Primer Formulations

-Characterizing multiple destabilizations simultaneously-



Introduction

Transparent and semi-transparent primers are dispersions that are formulated to be stable for extended time periods. Their formulas can be slightly turbid without being completely opaque but visual analysis of the phase separation of these materials is still subject to guesswork and timeline extrapolation. This physical stability characteristic must be tested in order to determine the integrity of the substance during store shelf ageing, warehouse storage, and transport through various climates. This note will show how Turbiscan® technology permits to evaluate and distinguish primers in terms of stability which was not possible by visual observation.

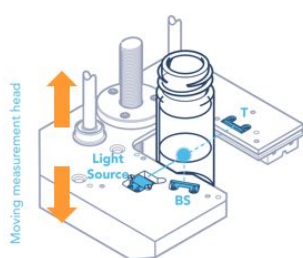
KEY BENEFITS

VERSATILE
TURBID SAMPLES
FAST METHOD

Reminder on the technique

Turbiscan® technology, based on Static Multiple Light Scattering (SMLS), consists on sending a light source (880nm) on a sample and acquiring backscattered (BS) and transmitted (T) signal over the whole sample height. By repeating this measurement over time with adapted frequency, the instrument enables to monitor physical stability.

The signal is directly linked to the particle concentration (φ) and size (d) by the Mie theory knowing refractive index of continuous (n_f) and dispersed phase (n_p):



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

Materials & Method

Three primer samples were analyzed with the Turbiscan®. The experiments were conducted at both 25°C and 50 °C in order to mimic the conditions these materials may see over their post-production lifetime.

Each sample was then scanned every 60 minutes for 2 days in order to produce the destabilization profiles.

Results

Raw data

The slightly turbid samples are studied in delta transmission mode (ΔT), where the first scan is used as a reference scan and the following data shows the evolution of the sample as compared to this first scan. Figure 1 below displays a representative sample that has aged at 50 °C.

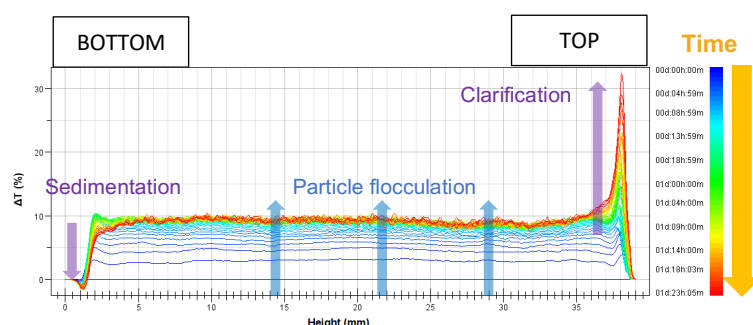


Figure1: Delta transmission data of a transparent primer.

First scans (blue) show early global evolution on the entire height of the sample. This is typically an indication of occurring flocculation.

Following scans (green to red) show at the top of the sample a large positive evolution of the transmission signal with the accompanying negative/decreasing transmission signal at the bottom of the sample (left of the graph).