

Small volume direct emulsification screening - Fast method for pre-process optimizations -



Introduction

Stabilizers and surfactants play a key role in assuring desired product shelf life. Regulations and new customer habits are challenging formulation scientist to constantly review their stabilizers and additives to fulfill these expectations. Lately the trends move towards greener and eco-friendly alternatives. The range of new stabilizers is now extremely wide and diversified and so the possibilities for new formulations can be limitless. Turbiscan®, the leading technology to measure the stability, can prove to be a perfect screening and ranking tool. Additionally, with the new online modules, a fast measurement of the dispersion state can be done directly during the formulation steps thanks to the T-MIX module (with only 15mL) or as process optimization steps with online T-LOOP module.

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.

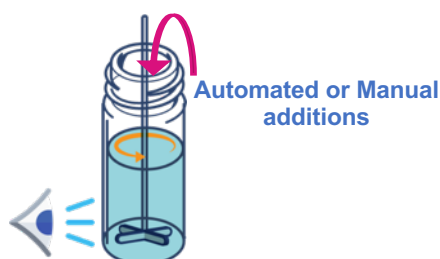
$$BS \text{ and } T = f(\phi, d, n_p, n_f)$$

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 can be associated with 2 dispersing tools allowing to increase its capabilities:

- T- MIX for automated fast formulation screening with a stirring bar directly inside the measurement cell.
- T-LOOP for online measurements and scale up or process optimizations.



Experiment and method set up

The aim of the work: Compare emulsification capabilities (oil droplet size) of two natural surfactants (coco-glucoside and decyl-glucoside) to Tween 20, a commonly used stabilizer

The emulsion type: 20% v/v sunflower O/W emulsion with 1% surfactant

Sample preparation: The oil, water and the surfactant are added in the measurement vials (15mL) for the Turbiscan analysis. On top of the vial the T-MIX module is mounted, with a mixer blade and a customized cap for blade guidance. The shear and mixing speed are directly applied to the emulsion in the measurement cell.

Sample analysis: The mixing rate is fixed at 2000 rpm and the measurement of the BS and T is started immediately, with no delay, and a frequency of 10 measurements/seconds. The mixing is monitored for 10 minutes. Particle size is measured during the emulsification process, without any sampling nor dilution.

Using this setup, the amount of surfactant is limited to few mL, ideal for fast screening and pre formulation work with **low sample consumption**.