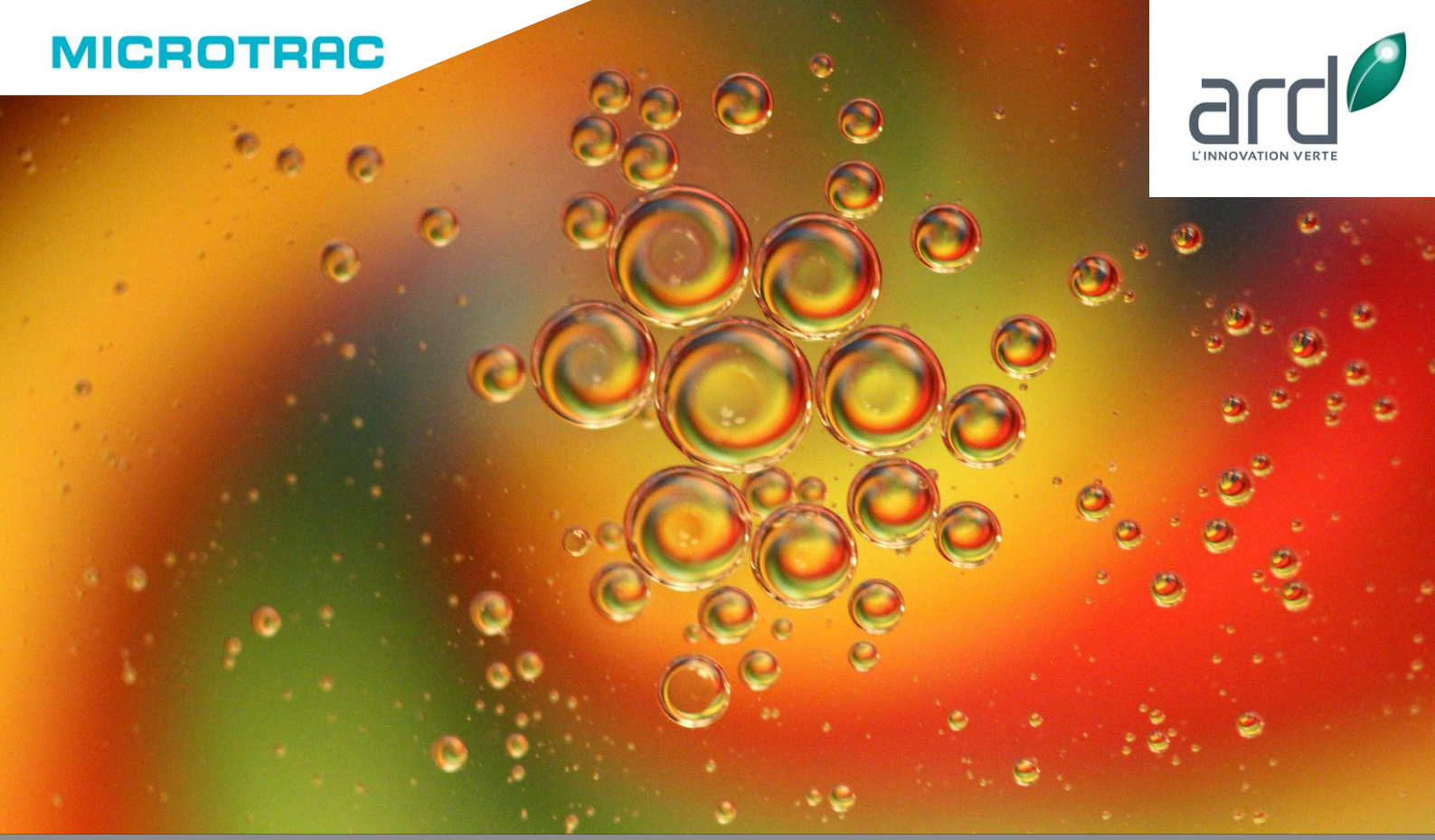


FORMULATION OF CONCENTRATED EMULSION

FOR NATURAL AGROCHEMICAL

Context

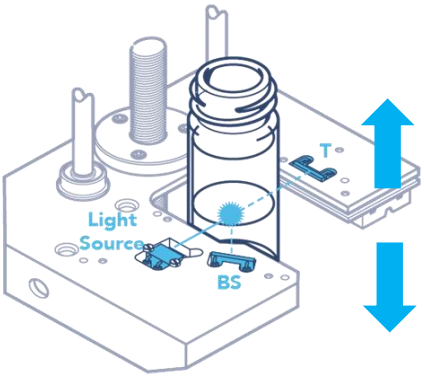
Oils are used as components of agrochemicals for the treatment of beetroot, maize, and wheat as they increase the foliar penetration of the pesticides. For their application, oils have to be dispersed in water by the user in the form of a coarse emulsion of low concentration and stable for a few hours (time of the treatment). The dispersion in water has to be spontaneous. To do that, the oils used by the user are pre-formulated and can be found in two formats: emulsifying emulsion (a surfactant solution in oil) or concentrated emulsion (an O/W emulsion at 70 to 80% oil).

The company ARD has formulated a concentrated emulsion with methyl ester of canola seed as oil and a natural surfactant based on sugar as an emulsifier. The main constraints of the formulation are the stability of the concentrated emulsion in storage and its ease of use (fluidity, dilution) as well as the relative stability of the diluted emulsion for use in the field. The latter has to form spontaneously (without bringing any external energy) and has to be stable during application.

Reminder of the technique

TURBISCAN technology, based on Static Multiple Light Scattering, consists of sending a light source (880nm) on a sample and acquiring backscattered (BS) and transmitted (T) signals over the whole sample height. Repeating this measurement over time with adapted frequency, the instrument enables monitoring physical stability.

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



BS and T = f(φ, d, np, nf)

Method

The experimental plan mimics the use of the product.

Samples are prepared directly in the TURBISCAN cells and analyzed quickly. 200µL of concentrated emulsion are added to 5 mL of tap water. The tube is then closed with a stopper and agitated by turning it upside down three times.

Results

The evolution of the thickness of the transmission peak is followed for two hours (Figure 1). The kinetics of destabilization are done by constructing the curves of delta transmission (reference curve at t=0, absolute thickness threshold of 2%) as a function of time (Figure 2).

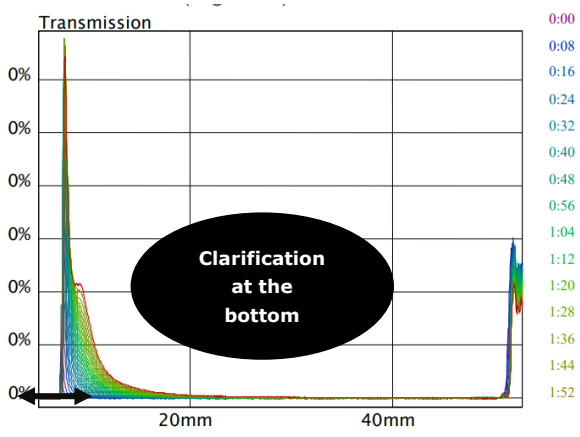


Figure 1. Transmission profile of the emulsion

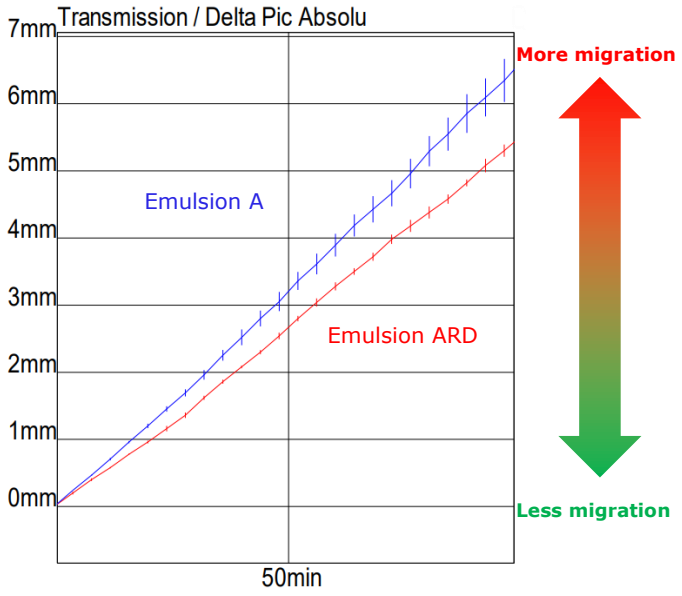


Figure 2. Kinetics of absolute thickness transmission peak of ARD emulsion and commercial emulsions A

The destabilization speeds of diluted emulsions have been determined by calculating the slopes of the curves Δtransmission = f(time(min)). These values are chosen as references to compare the formulations prepared and to have an idea of the performance of the product compared to commercial products.

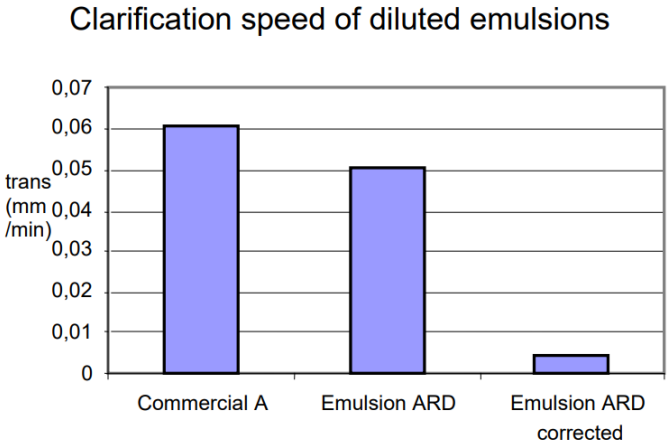


Figure 3. Clarification speed of different emulsions

The results obtained show that the products formulated by ARD are at least as good as commercial products and that the optimization of ARD emulsions gave a better stability of the corrected emulsion compared to the initial one and to the commercial product.

Conclusion

TURBISCAN technology based on Static Multiple Light Scattering (SMLS) is the leading technology since 1994 to measure the stability of formulations and dispersions. This Application Note shows a quick and simple method to compare the stability of different emulsions **in only 2 hours.**

These studies on the kinetic destabilization of diluted allowed, very quickly, the determination of the best formulation of an agrochemical component that showed very good efficiency in the treatment of fields.

The world leader in Stability & Dispersibility Analysis