

Determination of the Detergency Properties of Surfactants

INTRODUCTION

The detergency mechanism is based on the physico-chemical properties of the surfactant, the fat to eliminate and the surface to clean. The spread of the soil on the surface is reduced by the wetting of both the surface and fat by the surfactant (modification of the contact angles water/fat/surface). Hydrodynamic forces thereafter siphon off the fat soil in the cleaning water and fraction it. This is the emulsification step. The oil droplets is eventually solubilized in the water and eliminated.



ARD produces natural surfactants (alkyl polyglucosides) that are used for formulating home care products. Their apolar part is coming from agro resources.

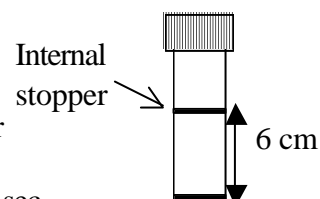
This study is dealing with the potential of natural surfactants to emulsify fat and is done by measuring the interfacial tension between water and oil and the stability of the emulsions formed using the **Turbiscan Classic**.

SAMPLE PREPARATION AND EXPERIMENT PLAN

The experiment consists in measuring the stability of an emulsion prepared with sunflower oil and a detergent surfactant. As the emulsions are very unstable, the emulsification is carried out directly in the **Turbiscan Classic** cells that have been previously modified (see below). The analysis is done immediately.

The composition of the emulsion is given :

- 6% oil
- 3% surfactant
- Qsp 100% demineralised water



The emulsification is carried out at ambient by stirring the tube in a vortex for 30 sec.

RESULTS

The measurements are done by following the evolution of the backscattering for two hours (Figure 1). Then, one draws the graph of the evolution of the thickness of the peak at the bottom of the tube (reference at t=0) as a function of time (Figure 2).

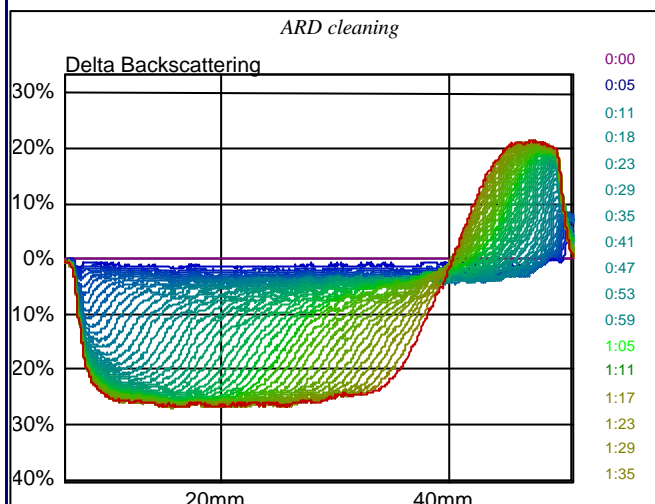


Figure 1 : Evolution of backscattering.

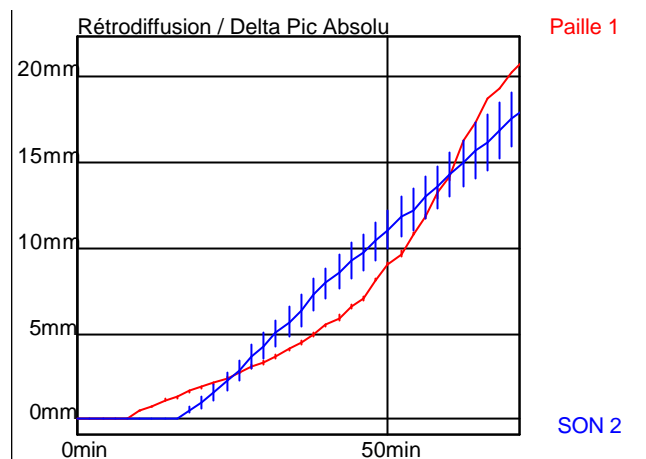


Figure 2 : Absolute thickness of the backscattering peak

The speed of the destabilisation of the diluted emulsions are determined by calculating the slope of the curves $\Delta \text{backscattering} = f(\text{time}(\text{min}))$. These values are chosen as reference to compare the efficiency of the surfactants (Figure 3).

Ref	γ (mN/m) interfacial tensions W/O	Clarification speed (mm/min)
Son 1	0.25	4.97
Son 2	0.07	0.25
Paille 1	0.05	0.19

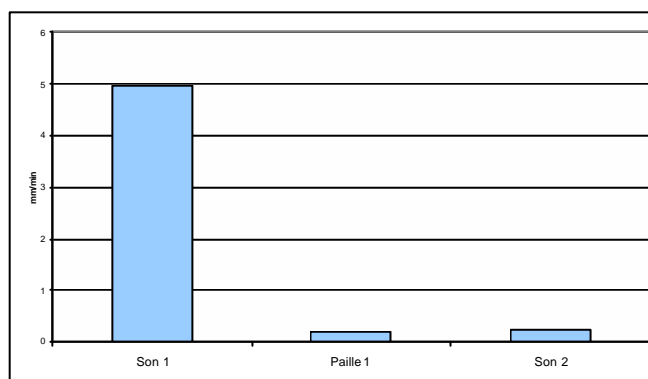


Table 1 : Comparison of the results between Turbiscan MA2000 / interfacial tensions.

Figure 3 : speed of destabilisation of emulsions with various surfactant.

The measurements done are summarised in Table 1.

The results obtained quickly with the **Turbiscan Classic** are in agreement with the interfacial tension measurements given by a spinning drop tensiometer (time consuming measurement) and allow a differentiation between the emulsifying capacity and therefore the detergency potential of the different surfactants in a very quick and easy way.

CONCLUSION

The use of the Turbiscan Classic allowed the determination of the best surfactant for detergency as the best emulsifier of fat soil, and that very quickly compared to classical techniques.