Foamability of a surfactant

INTRODUCTION
A lot of industrial applications require the control of the foamability of the surfactants used in the formulations to increase it (shampoo, detergent, etc.) or to prevent it (pulps, paper industry). Moreover, for applications requiring a good foamability, this one needs to be controlled as too much foam can be an issue (difficulty to rinse off). Therefore, it is of great interest to have a good characterisation of the use property. Various techniques are already available in the industry but they are usually complex and very specific.

The Turbiscan LAB enables to measure the quantity of foam produced in an easy way with the possibility to form the foam within the measurement cell.

METHOD
Several surfactants have been tested after dissolution in demineralised water at various concentrations. 10 mL of these solutions were put in the measurement cells. The foam is created in-situ with a rotor-stator homogeniser (Ultraturrax®) for 5 minutes. The analysis is performed with the Turbiscan LAB immediately after.

The determination of the foamability of the surfactants is done by using the scan mode of the apparatus to measure the height of foam created. This will give a value of the foamability of the surfactant.

A parallel study was also done to measure the stability of the foam. It is reported in a separate application note “Stability of a foam”.

RESULTS
One of the easiest way to get a foam is by agitation of the surfactant solution and the measure of the quantity of foam obtained after the agitation. However, this method has some drawbacks especially regarding reproducibility as lots of parameters, such as the quantity of air and liquid, the viscosity of the liquid etc., can modify the results. We have therefore checked the reproducibility of the measurements in order to get the best experimental set up. The formation of the foam directly in the measurement cell by agitation 5 minutes with the Ultraturrax® gave us a good reproducibility (Figure 1).
The foamability of the surfactant is determined by calculating the quantity of foam created during agitation. This is very easily visualised with the Turbiscan LAB by looking at the profiles in transmission and/or backscattering (Figure 2).

![Figure 1. Study of the reproducibility of the measurements](image1)

![Figure 2. Profiles of transmission and backscattering of a surfactant solution](image2)

It is therefore possible to follow the evolution of the foamability of a surfactant at different concentrations (Figure 3). It is also possible to compare various surfactants very quickly (Figure 4).

![Figure 3. Foamability of a surfactant](image3)

![Figure 4. Foamability of various surfactants](image4)

As the Simulsol® is only forming very little foam at 1% it has not been studied at lower quantity. It will be a good choice for the formulator who does not want any foam during the process. On the other hand Oramix® will be chosen for application requiring a good foamability.

**SUMMARY**

The Turbiscan LAB enables the characterisation of the foamability of surfactants by measuring the quantity of foam created after agitation. It can be used to compare various surfactants and get the best one depending on the application.