APPLICATION NOTE

CONTROL OF THE QUALITY AND THE PERFORMANCE OF SURFACTANTS

The surfactant industry provides compounds for a large range of applications such as detergent, cosmetics, food and pharmaceutical industry. These various applications require a large number of different tests depending on the end-use property of the product.

Application 1: Control of the emulsifying power of surfactants. The emulsifying power measures the ability of a product to help the formation of an emulsion.

× **Common method:**

The emulsifying power is measured *via* the production of a standard emulsion and the study of its stability through visual observation. The emulsification method (time and speed of agitation) and the composition of the emulsion (nature and volume fraction of the dispersed phase) are set. For R&D tests, the concentration and the nature of the surfactant are the only parameters to change. In quality control, the formulation remains the same but the production batch of the surfactant varies. The efficiency of the surfactant corresponds to the measurement of the stability of the emulsion compared to a reference emulsion. The test takes more time if the surfactant is efficient as the emulsion is more stable than the reference. Stability tests are generally accelerated by storing the emulsions at high temperature (40 to 50°C) but they can take a couple of days.

The quality control of a production of surfactant can therefore take a few days, holding back the distribution of the batches.

× **Turbiscan® method:**

The Turbiscan LA*b* enables to accelerate stability tests of emulsions prepared with the same standard method as previously mentioned. The equipment also gives the possibility to draw kinetics of instability (migration or particle size variation) and therefore to compare easily newly produced batches to reference values. The thermoregulation up to 60°C enables to accelerate the tests even more.

Using the Turbiscan LA*b*, the control tests of surfactants are accelerated up to 30 times, enabling to increase the production capacity and to improve the reliability of the products.

Application 2: Control of the foamability of surfactants. The foamability measures the ability of a product to form foam.

× **Common method:**

Various methods exist to determine the quantity of foam formed by a surfactant. Among them is the Ross-Miles method, which consists of a given surfactant solution falling from a set height into the same surfactant solution, hence creating foam. The height and the stability of the foam over time are visually assessed. In the case of surfactant with a low foamability or anti-foam products, the recommended method is the agitation of the surfactant solution with a turbine agitator during a set time and the measurement of the amount of foam created after pouring the solution in a volumetric cylinder. In both cases the measurements are visual. The stability tests of the foam are done by measuring the foam at set times.

The control of the foamability is done through visual methods that are tedious and quite subjective.

× **Turbiscan® method:**

Both methods previously described can be adapted to the Turbiscan LA*b* to enable the formation of foam directly in the measuring cell, hence avoiding to pour and to modify the quality of the foam. The scanning allows a quick and easy measurement of the quantity of foam created and the repeated analyses with time enable to determine the its stability. Stability kinetics can be compared.

The Turbiscan LA*b* enables a quick and accurate measurement of the foamability and the stability of a large range of surfactants (including anti-foam).

Application 3: Control of the dispersing power of surfactants. The dispersing power measures the ability of a product to help the formation of a dispersion.

× **Common method:**

The dispersing power is measured by controlling and comparing the stability of a suspension depending on the concentration and the nature of the surfactant, as for emulsions. This test is usually done by a visual observation of the sedimentation of the product analysed, which can get tricky depending on the opacity of the system. Moreover, particle size measurements, which are commonly used, can lead to artefacts due to the high dilution taken place during the analysis.

The control of the dispersing efficiency is often left to visual inspection and comparison with a reference dispersion. This test takes even more time if the surfactant is efficient.

× **Turbiscan® method:**

The Turbiscan LA*b* enables to accelerate the stability measurements of the suspensions and to quantify the kinetics of instability easily and without doing any dilution. Different surfactants can therefore be compared to a reference.

Using the Turbiscan LA*b*, control tests of surfactants are accelerated significantly. Moreover, the measurements are done on the real product, without dilution or denaturation.

All these different tests, corresponding to various measurements of end-use properties of surfactants, are done with the same equipment, the Turbiscan LA*b*, and concerns both the R&D laboratories developing surfactant molecules and the quality control laboratories controlling products after production. These tests can be used for surfactant industries as a selling tool to show the efficiency of their products to their customers.