HOME & PERSONAL CARE

Effect of a fragrance on perfume formulation stability

Introduction

Fragrances, once introduced into cosmetic applications, can occasionally impact the cohesion and stability of end-products and lead to instabilities. It is essential to provide stable products to avoid customer dissatisfaction.

KEY BENEFITS

- FAST
- SENSITIVE
- QUANTIFIED DESTABILIZATION

In this study, the effect of different fragrances on a personal care product emulsion was evaluated using the Turbiscan™.

The objective was to identify the best dosage for each fragrance avoiding product instability.

Reminder on the technique

Turbiscan™ instrument, based on Static Multiple Light Scattering, consists in sending a light source (880 nm) on a sample and acquiring Backscattered (BS) and transmitted (T) signal. Combining both detectors (BS & T) enables to reach wider concentration range. The backward reflected light comes from multiple scattering as the photons scatter several times on different particles (or drop).

This signal intensity (BS) is directly linked to different parameter, according to the Mie theory

$$BS = f(d, \varphi, n_p, n_f)$$

Method

Fragrances A, B & C are currently on the market in emulsion 1 at dosages included between 1.0 and 1.75%. In order to determine the best dosage for each of the fragrances in the new emulsion, samples A, B & C were added at 1.0% and 1.75% to the emulsion 2. The stability of all samples is analyzed by scanning them using the Turbiscan™ technology during 2 hours at 45°C.

Raw data

By analyzing the samples according to the method described in the previous paragraph, the following result is obtained:

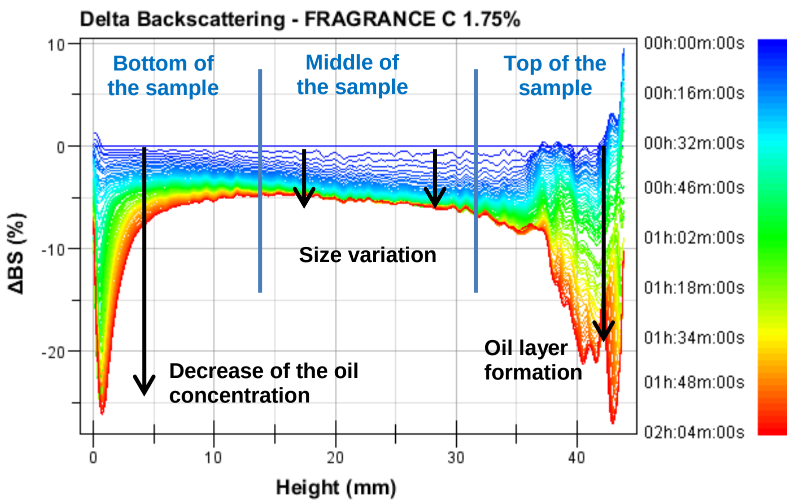

Figure 1: Backscattering variation for Fragrance C 1.75% in emulsion 2

The graph in Figure 1 is representative for all samples. A global decrease of BS intensity is observed meaning an increase of the droplets size. A phase separation of emulsion 2 can be identified since:

- at the bottom of the sample (left of the graph) light intensity decreases, meaning a that the concentration of oil decreases in this area.
- the formation of an oil layer is observed at the top of the sample.

The global stability (TSI)

It is possible to monitor the destabilization kinetics in the sample versus ageing time, thanks to the Turbiscan Stability Index (TSI). It sums all the variations detected in the sample (creaming, clarification, size variation, etc) and provides a single number to quantify the destabilization. At a given aging time, the higher the TSI, the worse the stability of the sample.

Fragrance	TSI after 1h30min		
	0.00%	1.00%	1.75%
A	0.6	1.0	4.3
B	0.6	1.3	1.1
C	0.6	0.2	2.4

Table 1: TSI values after 1h30min of measurement

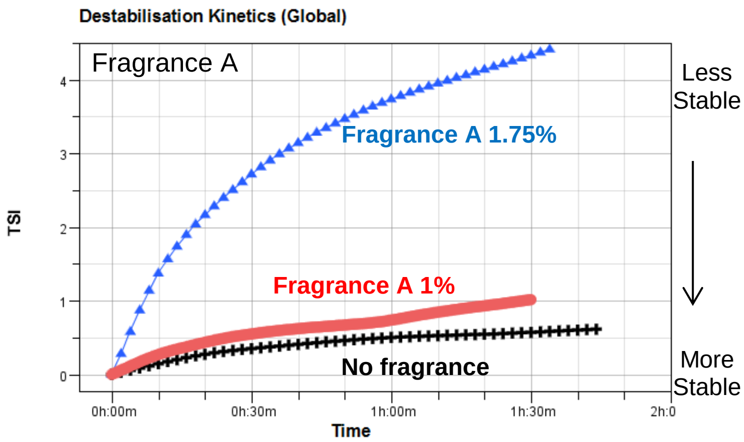

Figure 2: Turbiscan Stability Index for fragrance A in emulsion 2

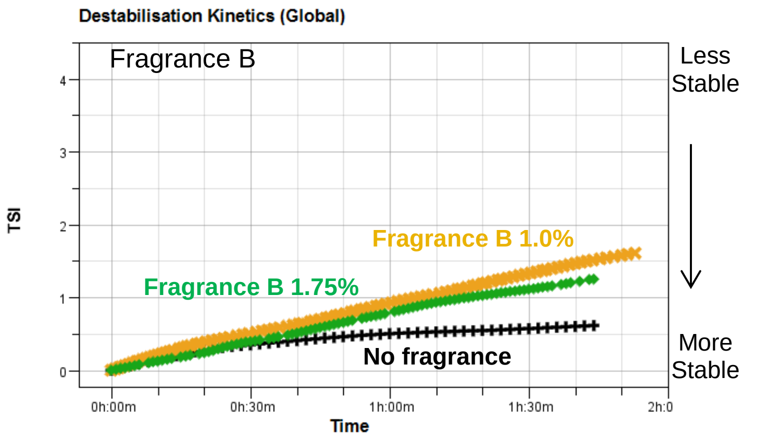

Figure 3: Turbiscan Stability Index for fragrance B in emulsion 2

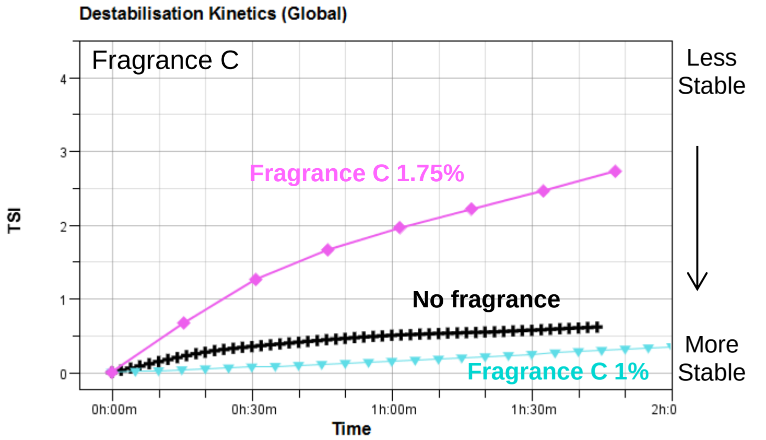

Figure 4: Turbiscan Stability Index for fragrance A in emulsion 2

For all samples except for fragrance B, an increase of the fragrance level from 1.0% to 1.75% leads to product destabilization in emulsion 2. This comparison was done in less than 2 hours, while visual observation at elevated temperatures requires days before reaching the conclusion.

CONCLUSION

This application note provides quick and simple method to select the best fragrance and optimize dosage. Concentration recommendation with the lowest impact on the stability of the final formulation are found in a short period of time (less than 2 hours). The following graph summarizes the results obtained