FOOD & BEVERAGES

Stability of chocolate milk containing different stabilizers

INTRODUCTION

Milk is a good source of several essential nutrients such as calcium, vitamin D and potassium. It is often recommended that milk should be consumed every day, especially for children. There are many popular milk products on the market that contain cocoa to create sweet chocolate milk drinks that are aimed at both children and adults.

Milk is an emulsion which is inherently unstable, however the addition of cocoa powder makes it even more unstable and therefore problems arise especially in storage. A stabilizer must be added to the keep the cocoa particles in suspension.

KEY BENEFITS

- VERSATILE
- NO DILUTION
- FAST AND ACCURATE

In this note, Turbiscan® was used to study the effects of different stabilizers on chocolate milk samples to determine which one performs best. 3 stabilizers A, B and C were analyzed for 6 days at room temperature.

EXPERIMENTAL RESULTS

Figure 1 shows the evolutions of the delta-backscattering (ΔBS) profiles versus sample height for chocolate milks with each stabilizer.

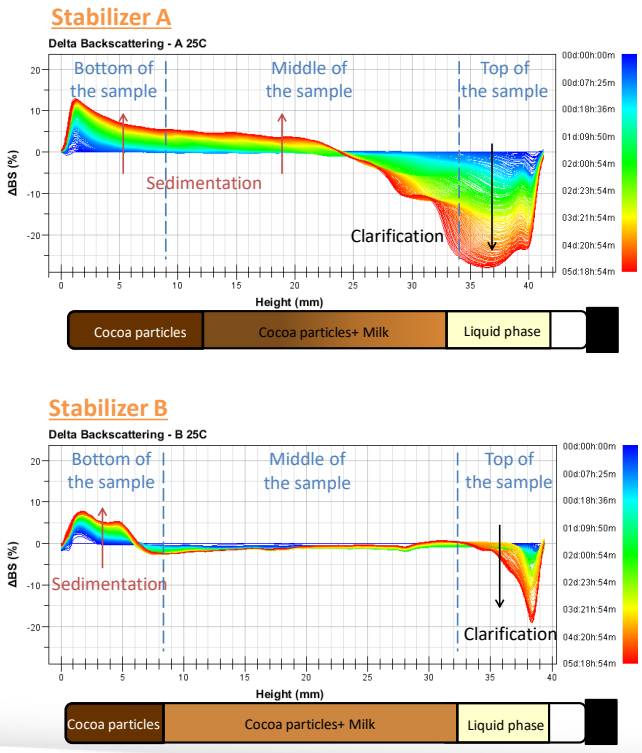

Figure 1: Variation of delta-backscattering (ΔBS) versus time and sample height for stabilizer A, B and C

With Turbiscan® it is possible to distinguish different phenomena of destabilization in 3 different zones of the samples (top, middle and bottom), this is summarized in Table 1.

Stabilizer	Bottom	Middle	Top
A	Sedimentation of cocoa particles	/	Clarification
B	Sedimentation of cocoa particles	/	Clarification
C	Sedimentation of cocoa particles	/	Clarification; Creaming of globule of fat

Table 1: Phenomena observed in three different zones of sample for chocolate milk with stabilizers A, B and C

1- The global stability (TSI)

The global stability of samples can be assessed by Turbiscan® thanks to the Turbiscan Stability Index (TSI). It adds up all the variations in signal detected due to destabilization phenomena (sedimentation, clarification, creaming, size variation, and etc.). At a given ageing time, the higher is the TSI, the less stable is the sample.

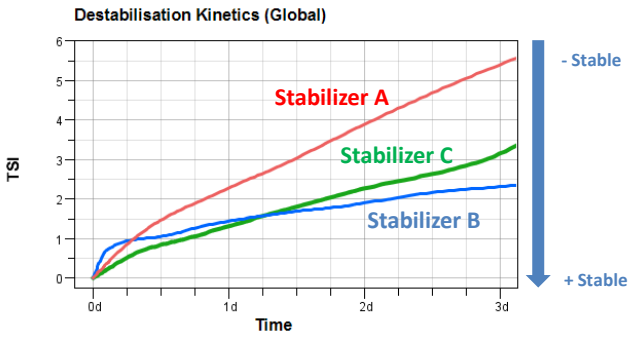

Figure 2: Turbiscan Stability Index versus time for chocolate milk containing stabilizers A, B and C

Figure 2 shows the TSI values for chocolate milk with different stabilizers. After 3 days of analysis it is clear that stabilizer B is more stable than A and C. It means globally the stabilizer B has the best performance in preventing the destabilization effects.

2- Migration rate of sedimentation

More detailed analysis can be carried out on the data, figure 3 shows the kinetics of sedimentation. It shows the peak thickness, so the thickness of the sediment layer, as a function of time. The migration rate of cocoa particles is obtained from the slope of the right part of each curve by automatic data computation.

The chocolate milk containing stabilizer B shows a slowest sedimentation of cocoa particles compared to two others. It means that stabilizer B is the best at keeping the cocoa particles in suspension.

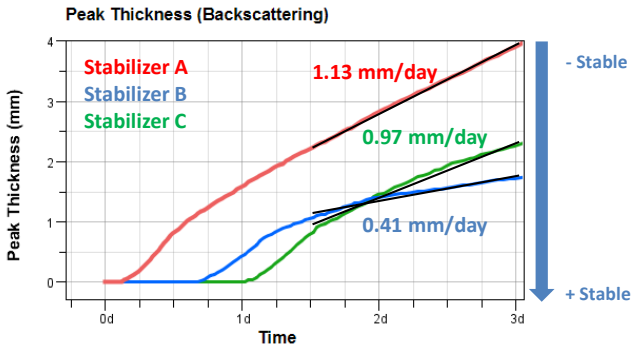

Figure 3: Sedimentation kinetics versus time for chocolate milk with stabilizers A, B and C. The slopes of every curve from 1.5 days to 3 days are illustrated.

In conclusion, the results from both the TSI and the peak thickness kinetic curves show that stabilizer B stabilizes chocolate milk the best out of the 3 stabilizers tested.

CONCLUSION

Turbiscan® was used to analyze chocolate milk samples containing 3 different stabilizers A, B and C. Destabilization phenomena such as clarification, sedimentation, creaming and etc. are detected by Turbiscan®. These phenomena are visible during the early hours of measurement highlighting the advantage of the instrument to detect instabilities in their nascent stage. It can therefore rank different samples in terms of stability quickly and precisely. The TSI values and the migration velocity of cocoa particles were quantified, and the order of stability is shown below:

A < C <B

- Stable → + Stable