

Stability Analysis of green Tea with the Stabino®

The Measurement principle

The [Colloid Metrix Stabino® System](#) is a streaming / zeta potential titration automat with measurement of zeta potential within seconds and integrated titration within minutes. Most samples can be analysed in original concentration. This accounts for innovative applications in production and quality assurance for the beverage industry.

In many applications, the particle charge and particle size as well as the agglomeration behaviour of a beverage is characteristic, so it is with green tea.

The particle interface potential measured in the Stabino® represents the amount of electrostatic repulsion between particles and depends on the pH value, the conductivity and the polyelectrolyte surrounding. The titration result is characteristic for the sample.



Fig. 1: Stabino®

Why titration of green tea?

To predict a long term stability of green tea, a so called polyelectrolyte titration to the zero point of charge was chosen. Generally speaking, the higher the start potential and the higher the consumption to the zero point of charge is, the more stable the system is because of the higher charge density. [FAQ Stabino®](#).



Fig. 2: Green Tea

Test procedure

10 mL of the original green tea samples were transferred into the Stabino® measurement cell and subsequently titrated to the zero point of charge with cationic 0.0025N P-DADMAC polymer solution. To verify the measurement result a double determination of sample 2 was conducted. Additionally, a size measurement before and after the titration with [180° heterodyne Dynamic Light Scattering \(NANO-flex®\)](#) was conducted exemplarily on one sample.

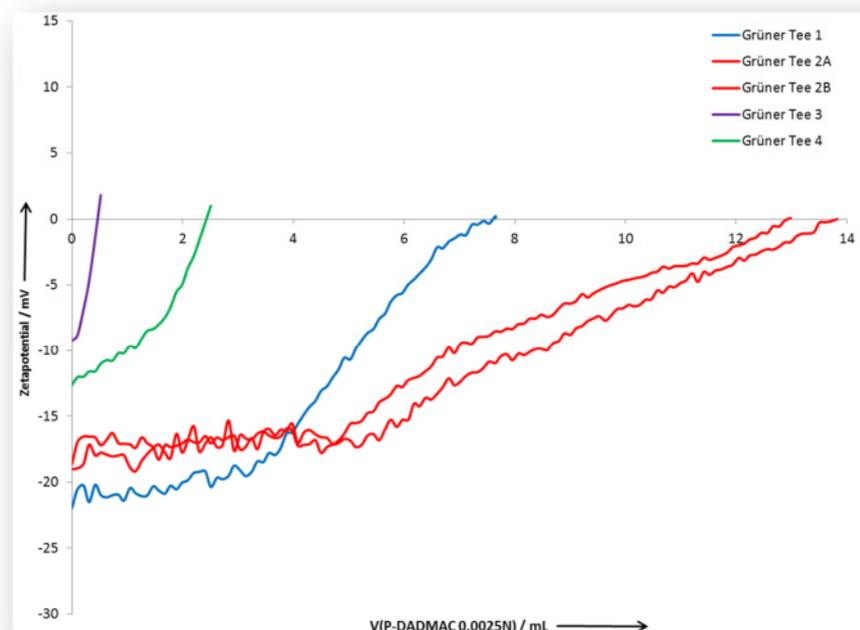


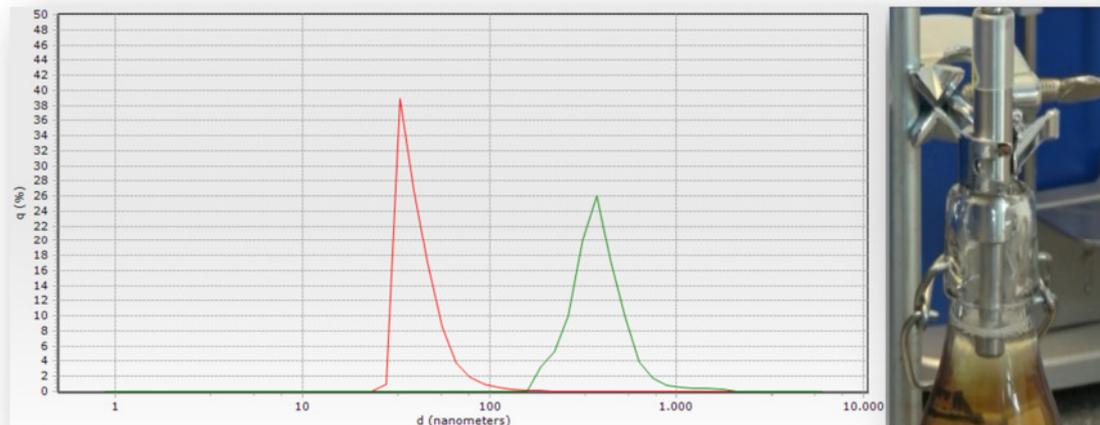
Fig. 3: Measurement data of the polyelectrolyte titration with 0.0025N P-DADMAC to 0 mV of the four green tea samples.

Table 1: Measurement data of the titration with start potential and consumption to the zero point of charge.

Sample name	Start potential P (0 mV) / mV	Consumption V (0 mV) / mL
Sample 1	-22.0	7.604
Sample 2A	-18.6	13.826
Sample 2B	-19.0	12.945
Sample 3	-9.2	0.464
Sample 4	-12.6	2.429

In **Figure 4**, the difference of the particle size before and after the titration can be seen very well. As the surface charge is neutralized by the titration and the potential is 0 mV, no more repulsion between the particles is present so that agglomeration / growth of the particles occurs. This would also happen over a longer aging process and causes a destabilization.

Fig. 4: Particle size distribution before (red) and after (green)



of the titration by the example of sample 1

Summary

With Stabino® the stability of green tea can very rapidly and easily be determined, so that statements regarding the storing and the long term stability can be made. By using the NANO-flex®, the agglomeration caused by the titration could be proven in the particle size.

To sum up, a combination of both methods for rapid stability analysis within a few minutes works well. Furthermore, a much more precise prediction in contrast to the classical “sight” sample of reference samples is given. An additional benefit of the Stabino® method is that the manufacturing process can be monitored immediately and if necessary, appropriate counteractions can be taken.