



STABILITY ANALYSIS OF GREEN TEA WITH THE STABINO ZETA

The measuring principle

The Microtrac STABINO ZETA system is a flow / zeta potential titration machine with a zeta potential measurement within seconds and integrated titration within minutes. Most samples can be analysed in their original concentration. This opens up new applications in production and quality assurance in the beverage industry. In many applications, the particle charge and particle size as well as the agglomeration behaviour of a beverage are characteristic, as in the case of green tea.

The particle interfacial potential, which is measured in the STABINO ZETA, represents the level of electrostatic repulsion between particles and is dependent on the pH value, the conductivity and the polyelectrolyte environment. The titration result is characteristic of the sample.



Fig. 1: STABINO ZETA

Why titrate green tea?

In order to predict the long-term stability of green tea, a so-called polyelectrolyte titration to the charge zero point was chosen. In general, the higher the starting potential and the higher the consumption at charge zero, the more stable the system is due to the higher charge density.



Fig.2: Green tea

Experiment execution

10 ml of the original green tea samples were transferred to the STABINO ZETA measuring cell and then titrated with cationic 0.0025N P-DADMAC polymer solution to the charge zero point. To verify the measurement result, a double determination was conducted on sample 2. In addition, a size measurement was carried out before and after the titration, using **180° heterodyne dynamic light scattering (NANOTRAC FLEX)** on one sample as an example.

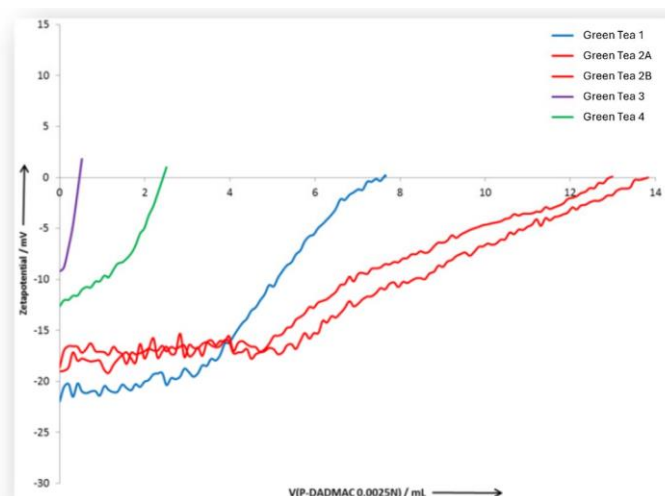


Fig. 3: Measurement data of the polyelectrolyte titration with 0.0025N P-DADMAC after 0 mV of the four green tea samples

Table 1: Measurement data of the titration with starting potential and consumption at charge zero point

Sample name	Starting potential P (0 ml) / 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

Figure 4 shows very clearly the difference in particle size before and after titration. As the surface charge is neutralised by the titration and the potential at the end is 0 mV, there is no longer any repulsion between the particles, so that agglomeration / growth of the particles occurs. This would also happen over a longer ageing process and thus cause destabilisation.

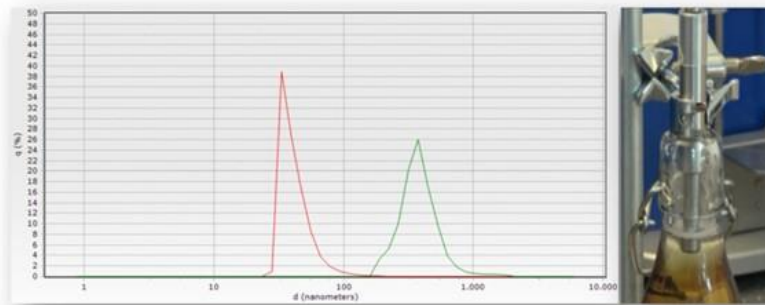


Fig.4: Particle size distribution before (red) and after (green) titration using sample 1 as an example

Summary

With the STABINO ZETA, the stability of green tea can be determined very quickly and easily, so that statements can be made regarding storage and long-term stability. By using the NANOTRAC FLEX, the agglomeration in the particle size caused by the titration could be detected.

In conclusion, a combination of both methods is suitable for rapid stability prediction within a few minutes. Furthermore, a considerably more precise prediction is given in contrast to the classic 'visual' test of retention samples. An additional advantage of the STABINO method is that it allows the manufacturing process to be monitored immediately and, if necessary, appropriate countermeasures to be taken.