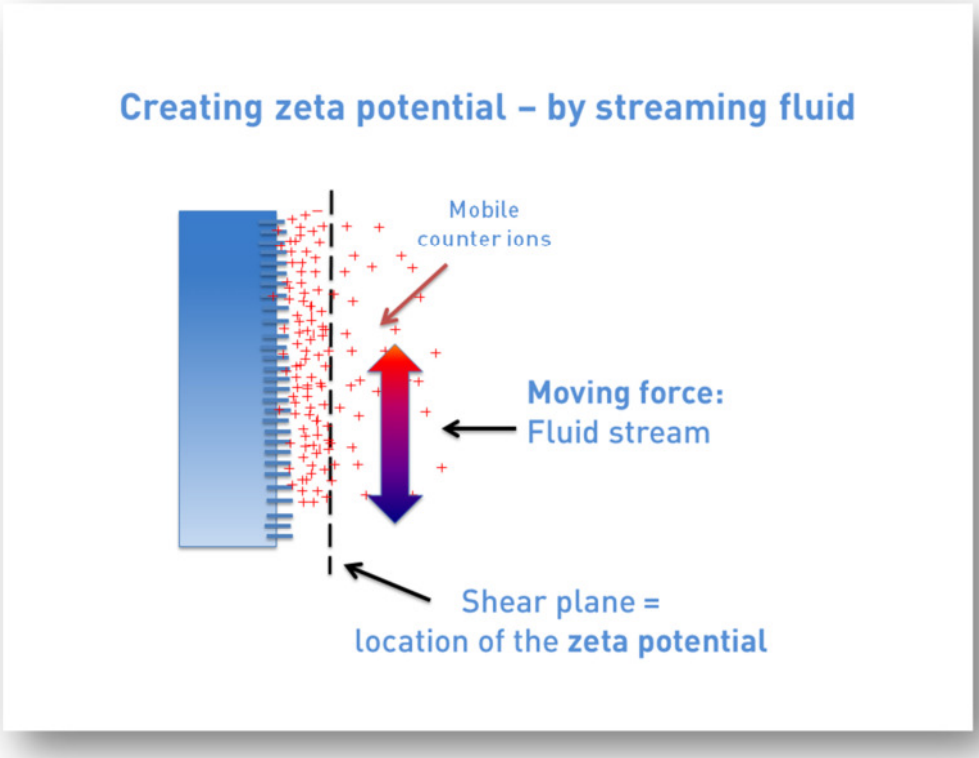
FAQ Stabino®

1) Which industries use streaming potential?

All industries, most of them in inks, food/beverages, new nanomaterials, ceramics, chemistry.



2) What is the difference between zeta potential and streaming potential?

The zeta potential is appearing at the shear plane. It cannot be measured directly. All setups listed below under a) to c) result in a signal but not as a direct zeta potential. The most frequent methods are:

a) **applying** an electric field → **electrophoretic mobility**
b) **applying** a streaming fluid → streaming current /**streaming potential**
c) **applying** an ultrasonic wave → **vibration current**

All 3 methods are shearing away the free counter ions from the shear plane. This creates a potential decrease which is correlated to the number of these sheared free ions. The potential decrease therefore correlates to the surface charge and the zeta potential of any interface, including the interface of particles. The calculation of a theoretically absolute zeta potential from making one of these 3 setups is complicated as it is based on assumptions. Electrophoresis is most frequently used, applying the Smoluchowski formula to calculate the zeta potential from the measured electrophoretic mobility. Although it is valid for a limited range of size and concentration, it is widely accepted. Therefore, other methods calibrate to the electrophoresis Smoluchowski calculation.

Absolute Charge Determination: More important than zeta potential is the total charge measurement by a titration to the zero point of charge (ZPC). The reason: a zero surface charge gives a zero signal, whatever the applied method is. A titration to the ZPC with a polyelectrolyte solution of known charge delivers an absolute result without the need of making assumptions.

The result of **adding a polyelectrolyte (PE) solution** of known elementary charge concentration, 0.01N cationic for example, until the measurement signal is zero is the so called "consumption". It is measured in Coulomb [C]. The measured charge referred to the mass [C g^{-1}], volume [C ml^{-1}] or total surface [C m^{-2}] is the so called charge density. These are **absolute results**.

NO ASSUMPTION needed - THIS is the strength of Stabino®.
Why? - The measurement is electro mechanical, with an extremely fast response; in this case a titration can be finished in a few minutes. In addition, the method is applicable to the widest field of samples (see table it in question 8). In most cases without the need to dilute the sample.

3) How does the streaming potential match to the zeta potential of the electrophoresis?

The streaming potential is calibrated to the electrophoresis potential of a known zeta potential standard. Again, the measured signal, whether it is calibrated to zeta potential or not, is a relative monitor signal for the presence of charges in the sample. The total charge is the most trustworthy answer about the amount of charges located on the surface of the sample and therefore the best prediction of the stability.

4) What kind of sample and solvent can be measured?

All samples from 0.3 nm to 300 µm.
Solvents: water and alcohols and mixtures of so called polar liquids. NO UNPOLAR ORGANIC SOLVENT!!! It does not make sense, by the way.

5) Is the temperature controlled?

A sensor is included as standard. A temperature controller is an accessory (0°C up to 90°C).

6) What is the function of the piston gap?

The streaming velocity of the liquid depends on the gap between the cell wall and the piston. Narrow gap = high fluid speed, wide gap = low speed. The gap (streaming velocity) plays on the sensitivity of the signal. It is comparable to the linear influence of the electric field to the velocity of the particles in an electrophoretic setup.

7) What is the difference between white cell and black cell?

White - for clear and white samples.
Black - for colored and black samples.

8) What are the strengths of Stabino® related to optical methods?

Strengths of Stabino®	Stabino®	All optical methods
Size range 0.3 nm to 300 µm	☺	☹
Macromolecules	☺	☹
Big and sedimenting particles < 300 µm	☺	☹
Total Charge and Charge density (absolute)	☺	☹
Titration time to zero charge	> 5 min	> 1 hour
Transparent and black samples	☺	☹
No problems with the influence of bubbles	☺	☹
Simultaneous size titration possibility	☺	☹
Temperature stabilized titration 0°C to 90°C	☺	☹
No consumables are necessary	☺	☹

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