

Solid Surface Analysis (Zeta Potential)

Anton Paar, SurPASS™ 3

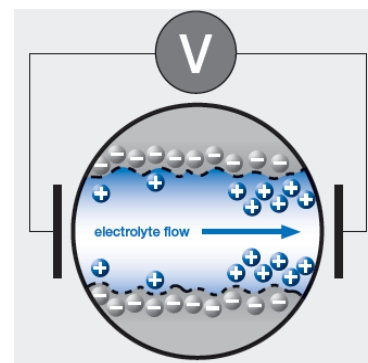


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Introduction

The surface properties of a material are an important factor in membrane applications. When electrostatic interactions are involved the membrane surface charge represented by the zeta potential is a dominant parameter in the membrane filtration process.

The SurPass 3 measures the zeta potential of a solid surface when in contact with an aqueous electrolyte solution to better understand the influence of parameters like pH and ionic concentration.



Principle

The zeta potential is calculated based on the streaming potential or streaming current that is generated by the flow concentration of an electrolyte solution along or through a solid surface. As a result of interaction, surface charge of the sample is compensated by the counter ions present in electrolyte solution. Flow of the electrolyte through the channel forces ions to move towards flow direction which result in charge separation between two ends of the channel.

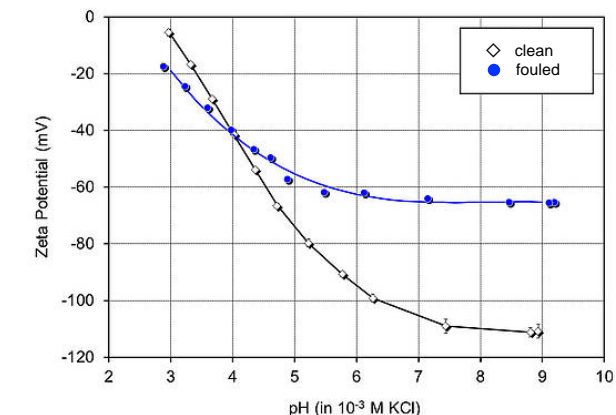
Subsequent to charge separation, electrical force as back current occurs which acts in the opposite direction of the flow. The net charge separation is then recorded by an electronic circuit connected to inlet and outlet of the channel as a potential difference which is called streaming potential. Streaming current is measured with different electronic circuit.

Applications

Zeta potential analysis can be used for a wide variety of studies such as:

- Retention and fouling analysis of the membranes
- Surface modification and characterization analysis

Zeta potential measurement to monitor the effect of fouling



Measuring range

- pH and conductivity range: pH 2-12; 0.1-1000 mS/m
- Temperature range: 20-40 °C
- Streaming potential: $\pm 2000 \text{ mV} \pm (0.2 \% + 4 \mu\text{V})$
- Streaming current: $\pm 2 \text{ mA} \pm (0.2 \% + 1 \text{ pA})$