Application Note – Colloid Analysis

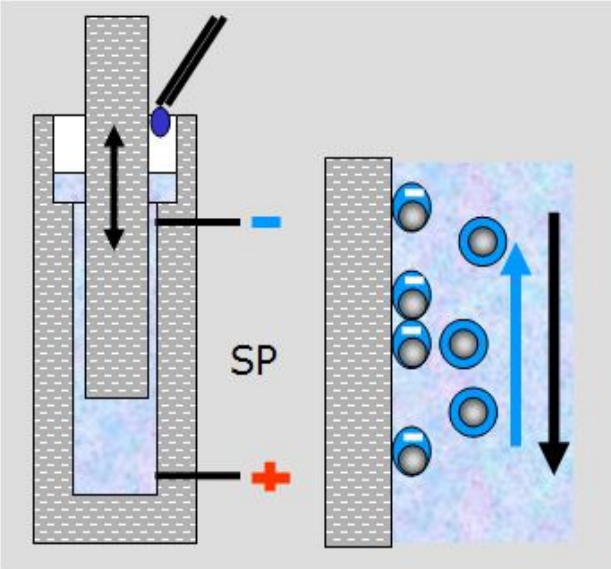
C04 - Isoelectric point determination of powder suspensions

Introduction

At the isoelectric point (IEP) of a suspension, where the ionic interface charge of a particle is zero, coagulation occurs, solubility is zero, no protonisation or de-protonisation and no dissociation occurs. In many applications it is important to determine the IEP, one of them being to produce particles with an IEP that will produce a stable suspension. Up to now, it was difficult to measure the IEP of powder suspensions. Usually, sedimentation is the limiting factor.

The Stabino® Charge Titration Method

In the Particle Metrix **Stabino®** 10 ml of a suspension are constantly agitated during measurement. This movement guarantees that the sample stays homogeneous whilst the measurement of the **Stabino®** potential is in action. The monitoring signal during the addition of charge modifying liquids (titration) is the electro-kinetic potential. This arises from displacing the ionic cloud (double layer) at the particles interface, when the liquid is passing the particles. The titration steps are at intervals of between 3 to 30 seconds. The amount of titrand solution added per step is between 10 and 100 µl, depending on the signal change and the selected titration program.

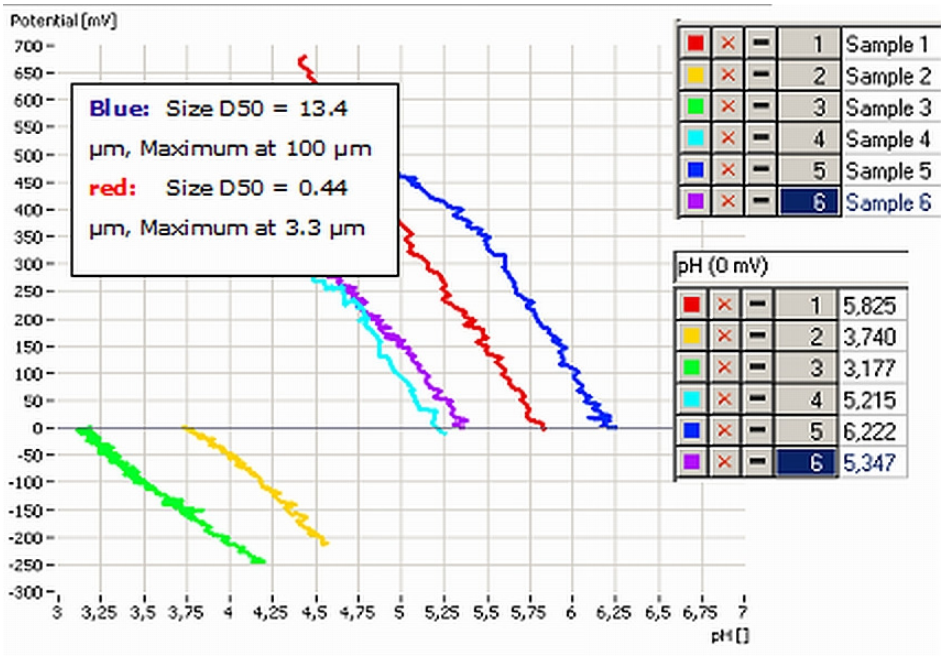


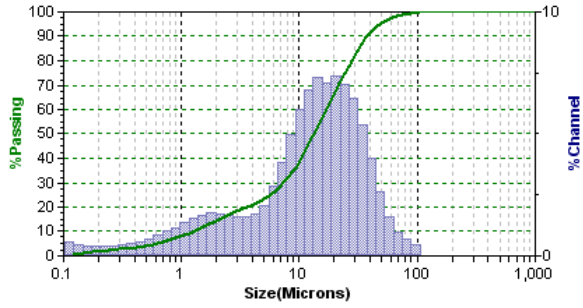
Stabino® principle: Piston moving up and down in the measurement cylinder, inducing the particle interface potential SP and mixing during auto-titration.

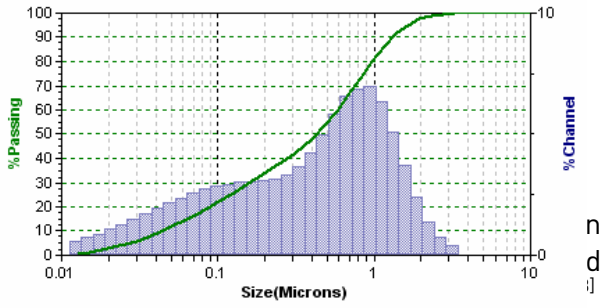
The software and instrument configuration are designed to characterize the ionic surface in an environment close to the end product

The Results

The diagram shows pH - charge titrations with NaOH and HCl, on 6 suspensions. Their size distributions range from 0.02 to 100 µm. Two of the powders were selected as being representative (red and blue). Their particle size distributions were measured with the Microtrac "BlueWave" Mie Scattering particle size distribution analyser.







Summary and Benefits

Usually, suspensions of 0.01 to 10% concentration are measured in a 10 ml Teflon® cylinder. The sample is constantly agitated as the titrand is added to the sample. The upper limits are concentration at 50%vol, viscosity at 50 mPa.s, conductivity at 50 mS/cm, all dependent on the sample and the application. The duration of one titration depends on the concentration of the sample and the titrand. In one hour, 5 titration curves can be easily acquired. No sample parameters are needed, making the **Stabino®** method very efficient and simple.

For more information contact:

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