Zeta Potential [psl8]

The electric field of a negatively charged colloid suspended in an electrolyte is screened by counter-ions. The double layer consists of (i) the surface charge and (ii) a layer of counter-ions with co-ions mixed in. The outer layer has a (sharply defined) Stern part and a diffuse part.

The moving colloid drags along a cloud of ions of radius R_s . The magnitude V(R) of the electrostatic potential decreases monotonically with increasing radius R [pex25]. Its value at R_s is the ζ -potential: $V(R_s) = \zeta$.

The cloud of counter-ions impedes the mobility μ of the colloids. This effect is captured by models for the ζ -dependence of μ .

The ζ -potential is a measure for the effective repulsion between charged colloids. Charge stabilization remains effective if $\zeta \gtrsim 25 \text{mV}$.

The ζ -potential can be measured indirectly via

- streaming currents: colloids driven through capillary with charged walls.
- electrophoresis: augmented retardation force due to cloud of ions.
- electro-osmosis: motion of counter-ions along charged surfaces.



[image from Wikipedia]