**thickness of electrical double layer**

The length characterizing the decrease with distance of the potential in the double layer = characteristic Debye length in the corresponding electrolyte solution = $\kappa^{-1}$:

\[
\frac{1}{\kappa} = \sqrt{\frac{\varepsilon_r \varepsilon_0 R T}{F^2 \sum_i c_i z_i^2}}
\]

(rationalized four-quantity system)

\[
\frac{1}{\kappa} = \sqrt{\frac{\varepsilon_r R T}{4 \pi F^2 \sum_i c_i z_i^2}}
\]

(three-quantity electrostatic system)

where $\varepsilon = $ static permittivity = $\varepsilon_r \varepsilon_0$, $\varepsilon_r$ = relative static permittivity of solution; $\varepsilon_0$ = permittivity of vacuum, $R$ = gas constant, $T$ = thermodynamic temperature, $F$ = Faraday constant, $c_i$ = concentration of species $i$, $z_i$ = ionic charge on species $i$.

**Source:**