

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 = κ^{-1} :

$$\frac{1}{\kappa} = [\varepsilon_r \varepsilon_0 R T / (F^2 \sum_i c_i z_i^2)]^{1/2}$$

(rationalized four-quantity system)

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

(three-quantity electrostatic system)

where ε = static permittivity = $\varepsilon_r \varepsilon_0$, ε_r = relative static permittivity of solution; ε_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 .

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