



Figure 2.19

**Nernst-Planck Equation**

$$J_n(x, t) = -z_n F D_n \frac{\partial c_n(x, t)}{\partial x} - u_n z_n^2 F^2 c_n(x, t) \frac{\partial \psi(x, t)}{\partial x}$$

**Continuity**

$$\frac{\partial J_n(x, t)}{\partial x} = -z_n F \frac{\partial c_n(x, t)}{\partial t}$$

**Poisson's Equation**

$$\frac{\partial^2 \psi(x, t)}{\partial x^2} = -\frac{1}{\epsilon} \sum_n z_n F c_n(x, t)$$

**Electrolyte solutions → Electroneutrality**

if  $t \gg \tau_r$  and  $x \gg \Lambda_D$  then  $\sum_n z_n F c_n(x, t) = 0$





