$$\overline{c_{i,DL}} = \frac{1}{V_{DL}} \iiint_{DL} z_i c_{i,0} \exp\left(\frac{-z_i F \psi_{DL}(x,y,z)}{RT}\right) dxdydz \approx c_{i,0} \exp\left(\frac{-z_i F \psi_M}{RT}\right) \tag{15}$$

$$\sum_i z_i F \overline{c_{i,DL}} = \sum_i z_i F c_{i,0} \exp\left(\frac{-z_i F \psi_M}{RT}\right) = -Q_{DL} \tag{16}$$

$$\overline{c_{i,pore}} = (1 - f_{DL}) \times c_{i,0} + f_{DL} c_{i,0} \exp\left(\frac{-z_i F \psi_M}{RT}\right) \tag{17}$$

$$\sum_i z_i F \overline{c_{i,pore}} = (1 - f_{DL}) F \sum_i z_i c_{i,0} + f_{DL} F \sum_i z_i c_{i,0} \exp\left(\frac{-z_i F \psi_M}{RT}\right) = -Q_{DL} \tag{18}$$