

MDS Exam Problem (ECE201)

- (1) Assume a vesicle has a lipid bilayer membrane and a diameter of $1\mu\text{m}$. Inside the vesicle the concentration of KCl is 100 mM . The surrounding medium has a KCl concentration of 20mM . Assume that there exist K^+ channels but no Cl^- channels in the lipid membrane that is 8nm thick, calculate
- the membrane potential,
 - the final K^+ and Cl^- concentration after equilibrium is reached.
 - If the K^+ flux through the K^+ channels is $10^{10}/\text{s}$ and the vesicle can be modeled as a $10\mu\text{m}$ diameter sphere, estimate approximately how long it takes for the system to reach equilibrium.