- This can be predicted by the **Nernst equation**
    - **$E_x = (RT/zF) \ln ([X]_2 / [X]_1)$**
    - E_x is the equilibrium potential for any ion, X
    - R = gas constant
    - T = absolute temperature
    - Z = valence of the permeant ion
    - F = faraday constant (amount of charge in one mol)
    - Simplfied = **$E_x = 58/z \log ([X]_2 / [X]_1)$**
    - slope will be 58/z

If the right side was replaced with 10mM of Na^+ and the left with 1mM of Na^+ (ions were now sodium) the equilibrium potential would be +58mV because the valence is +1

- Ca^{2+} ions it would be +29mV
- Cl^- ion it would be +58mV again

Balance of chemical and electrical forces at equilibrium means that the electrical potential can determine ion fluxes across the membrane while ionic gradient can determine the membrane potential (voltage of the left side – voltage of the right side)

- -58mV is the voltage needed to counter the difference in K^+ concentrations on two sides of the membrane
- If the left side is initially made more negative that -58k that K will flow right to left
- Battery off = net flux of K^+ from left to right
- Battery on @ -58mV = No net flux of K^+
- Battery on @ -116mV = net flux of K^+ from right to left

Preview from Notesale.co.uk
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Electrochemical Equilibrium in an Environment with more than one Permeant Ion

Scenario:
10mM of K^+ and 1mM of Na^+ on left
10mM of Na^+ and 1mM of K^+ on right

- If the membrane was only permeable to K^+, membrane potential = -58mV