

- 1) What does Bockris & Reddy (the text in our packet) like and dislike about the Born model?

- 2) For an ion with a radius of 2.5 \AA being transferred from a medium with a dielectric constant of 2 to one of 80.
 - Write out the thermodynamic box for this transfer.
 - For each side write out the equation for the free energy of that reaction; a short description of the transfer reaction for that side; and give the actual amount of energy of the reaction (in kcal/mol).

- 3) Use the paper Science 1999 July 2; 285: 100-102 The Cavity and Pore Helices in the KcsA K⁺ Channel: Electrostatic Stabilization of Monovalent Cations Benoît Roux and Roderick MacKinnon .
 - Why is it hard (energetically unfavorable) to transfer an ion through a membrane.
 - What would it cost to transfer a K⁺ ion into the membrane (use necessary numbers from the paper).
 - Why does having a water filled cavity help? Describe this in words and also tell me what parameters change in the Born equation to reduce the energy cost.