

Abstract Submitted
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Theory Of Salt Effects On Protein Solubility¹ YUBA DAHAL, JEREMY SCHMIT, Kansas State Univ — Salt is one of the major factors that effects protein solubility. Often, at low salt concentration regime, protein solubility increases with the salt concentration(salting in) whereas at high salt concentration regime, solubility decreases with the increase in salt concentration(salting out). There are no quantitative theories to explain salting in and salting out. We have developed a model to describe the salting in and salting out. Our model accounts for the electrostatic Coulomb energy, salt entropy and non-electrostatic interaction between proteins. We analytically solve the linearized Poisson Boltzmann equation modelling the protein charge by a first order multipole expansion. In our model, protein charges are modulated by the anion binding. Consideration of only the zeroth order term in protein charge doesn't help to describe salting in phenomenon because of the repulsive interaction. To capture the salting in behaviour, it requires an attractive electrostatic interaction in low salt regime. Our work shows that at low salt concentration, dipole interaction is the cause for salting in and at high salt concentration a salt-dependent depletion interaction dominates and gives the salting out. Our theoretical result is consistent with the experimental result for Chymosin protein

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