

研究论文

用解析Ross变分微扰理论研究蛋白质盐溶液的渗透压

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收稿日期 2004-12-17 修回日期 2005-5-31 网络版发布日期 接受日期

摘要 采用软球三Yukawa势代替文献中的硬核双Yukawa势描述带电蛋白质分子之间的色散吸引、色散排斥和屏蔽静电排斥作用, 采用Ross变分微扰理论推导出解析状态方程(EOS), 克服了文献中常用的平均球近似对多Yukawa势存在的困难. 应用新理论研究了牛血清蛋白(BSA)-NaCl水溶液在不同pH值、不同浓度下的渗透压.

结果表明该理论独立参数的个数仅比林阳政等人最近提出的理论多一个, 而精确度有很大提高. 分析表明, 对于分子量大的蛋白质溶液体系采用新的软球理论比硬球理论会有明显的改进.

关键词 [蛋白质盐溶液](#) [渗透压](#) [Ross微扰理论](#) [解析状态方程](#) [三Yukawa势](#)

分类号

Study on Osmotic Pressure of Aqueous Bovine Serum Albumin-NaCl Solutions Based on Analytical Ross Variational Perturbation Theory

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Abstract Three-Yukawa potential was used to describe the attractive dispersion, soft-sphere repulsion and the screened static-electric repulsion interactions between protein molecules respectively instead of the hardcore two-Yukawa potential. A simple analytical equation of state has been derived based on the Ross perturbation theory to overcome the difficulty existing in mean-sphere-approximation (MSA) reported in literature. The equation of state has been applied to study osmotic pressures for aqueous bovine serum albumin (BSA)-NaCl solutions at various values of pH and concentration. The results show that the precision of new theory is superior to the theory recently developed by Lin Yang-Zheng, with only one more independent parameter. And it is shown that the new soft-sphere theory is more reasonable than Lin Yang-Zheng's one and more appropriate to the protein systems with large molecular weight.

Key words [protein-electrolyte aqueous solution](#) [osmotic pressure](#) [Ross perturbation theory](#) [analytical equation of state](#) [three Yukawa potential](#)

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