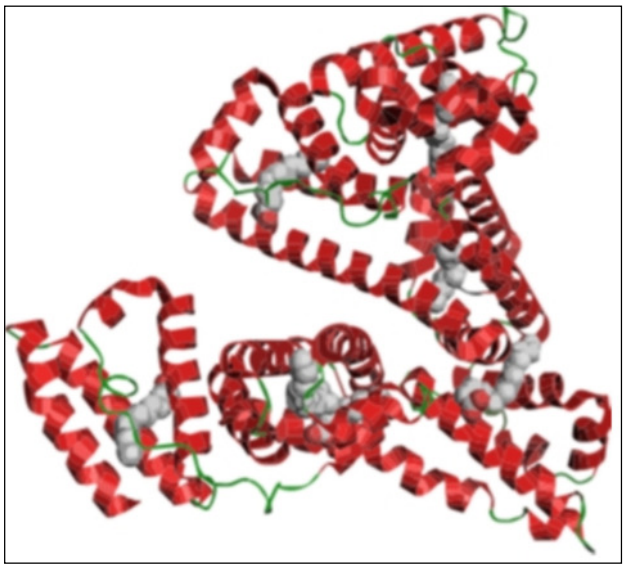
Application Note – Colloid Analysis

C02 - Solubility of Proteins by Ionic Charge Monitoring

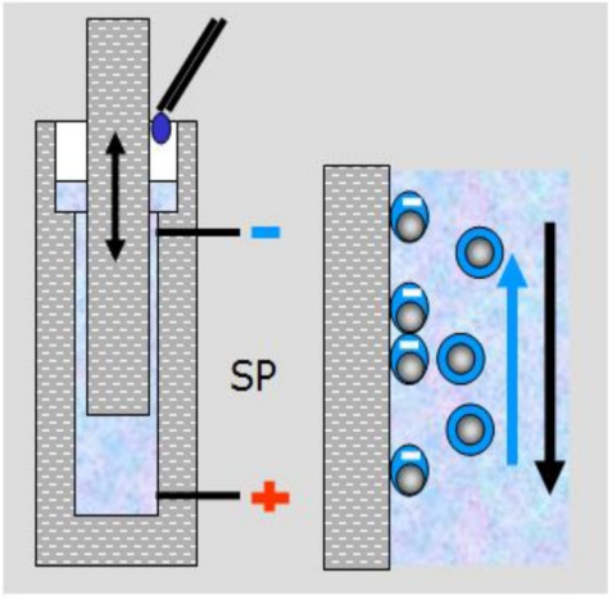
Introduction

Understanding the pH dependence of protein solubility is a key factor in the formulation of stable protein solutions. Protein solubility depends on pH, salt concentration, ion type, temperature and the solvent. Protein molecules such as lysozymes, insulin or albumin have polyelectrolyte characteristics with ionic side groups. At the isoelectric point (IEP) the protein solubility is zero. Hence, aggregation can occur.



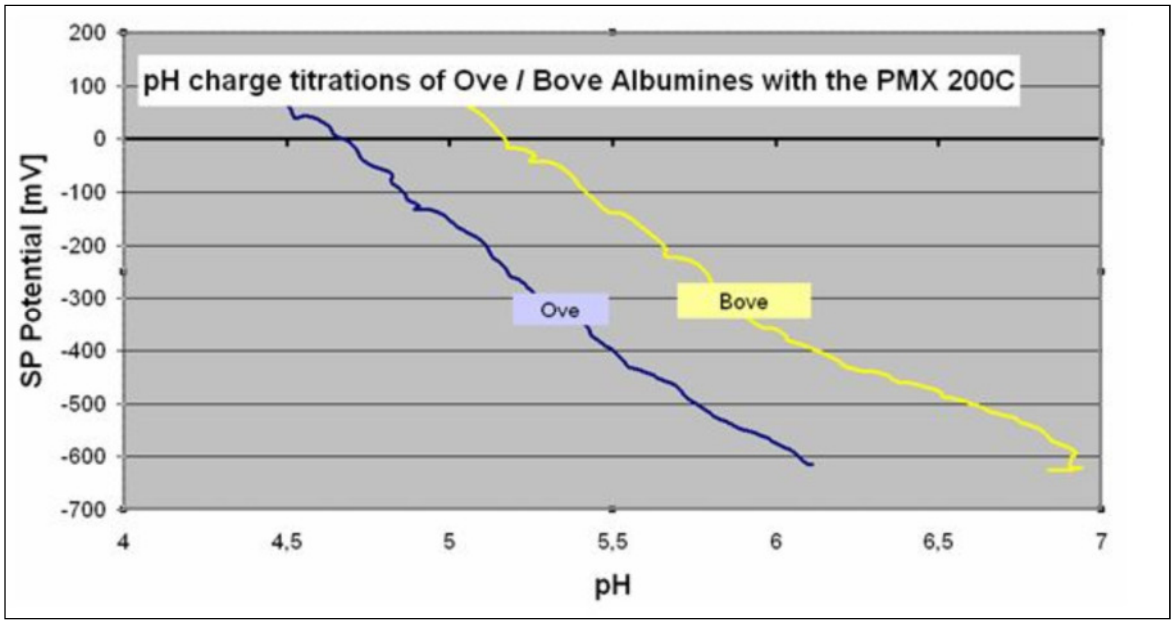
The Stabino® Experiment

With the **PARTICLE METRIX Stabino®**, titrations with pH, salt or polyelectrolyte solutions on a 10 ml, 0.001 to 10% v/v concentration dispersion can be performed within a few minutes. The monitor signal is the streaming potential **SP**, which correlates to the strength of the ionic charge at the interface of the particles or macromolecules. The potential also correlates to the solubility of the protein solution. The oscillating piston induces the signal SP, whilst mixing the titrand into the sample and preventing the suspension from sedimenting. Two titration units are integrated in the **Stabino®** to allow efficient particle and polyelectrolyte charge titrations.



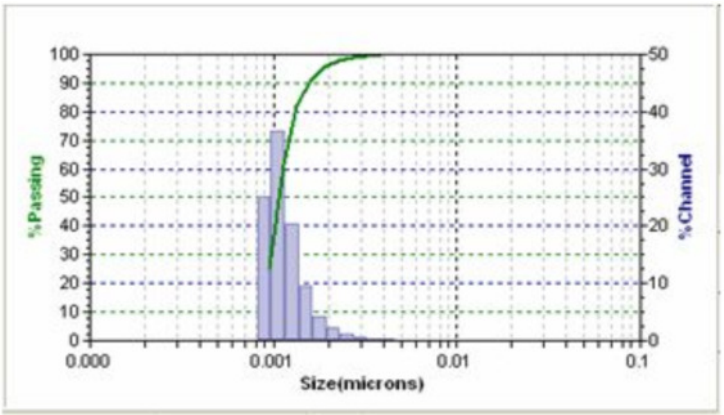
Stabino® principle: Piston moving up and down in the measurement cylinder, inducing the particle interface potential SP and mixing during auto-titration.

The Results



The above diagram shows pH titrations on 10 ml of 1% w/v hen (OVE) and bovine (BOV) albumins. The **IEP** of the 1 nm OVE albumin is at pH = 4.7, the IEP of the 5 nm bovine albumin is at pH = 5.2. At the end of the titration the samples were coagulated.

The **size measurement** was performed with the 180° DLS heterodyne backscattering NANO-flex measurement probe.



OVE albumin

Conclusion

With **Stabino®**, an efficient tool is available to do titrations without need of sample parameters. Screening work is favored.