Recent Experimental and Theoretical Developments of Ion Specific "Hofmeister" Phenomena

Andrea Salis
University of Cagliari, Italy

Ion specific phenomena are perhaps the longest unsolved puzzle of chemistry. About 130 years ago Franz Hofmeister observed that egg white proteins solubility was salt specific. He ordered the salts in an efficiency sequence universally known as the "Hofmeister series". During the 20th century a myriad of experiments showed that salt or, better, ion specificity is ubiquitous in chemistry (solution chemistry, colloidal science, electrochemistry) and biology. Unfortunately, our available theories of electrolytes (Debye-Hückel, 1923) and colloid stability (DLVO, 1941-1948) fail to explain and predict ion specificity. That is, LiI, NaCl, and CsF should behave in the same way because they are all 1:1 electrolytes. But they do not. In 1997 Collins proposed a phenomenological set of rules known as the law of matching water affinities (LMWA). LMWA explains and predicts at a qualitative level the order of ion-ion and ion-surface site interactions. The same year Ninham proposed the inclusion of additional quantum mechanical dispersion forces acting on ions which are missing from conventional theories. Ion dispersion forces and LMWA approaches appeared to conflict. In this presentation some recent experimental results, based on turbidimetric and dynamic light scattering measurements of model protein systems, are shown. These results can be rationalized only by considering that both approaches are at work.

Biography

Andrea Salis has completed his PhD at the age of 29 years from University of Cagliari, Italy. He is associated professor of Physical Chemistry and leads a research team focusing on Biointerfaces and Biocatalysis at the University of Cagliari. He has published 55 papers in peer review international journals and serving as an Associate Editor of the journal "Biocatalysis" (De Gruyter publisher).

asalis@unica.it

Notes: