

Electrostriction at the microscopic level: Hofmeister' series unveiled?

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How far does the structural perturbation induced by an ion in water extend? Despite the importance of this long-standing question, the ion induced modifications to the characteristic tetrahedral structure of water have never been accurately measured. We address this question by combining in a novel manner neutron diffraction data with computer modeling to investigate the oxygen-oxygen radial distribution function in NaCl and KCl aqueous solutions over a range of concentrations. Our results show that the perturbation goes well beyond the first hydration shell of ions, and causes significant distortion to the hydrogen bond network of water molecules out to at least the third oxygen-oxygen coordination shell. Interestingly, the presence of ions in solution has an effect similar to the application of pressure on pure water, giving microscopic insight into the phenomenon of electrostriction.