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Electrostatic Properties of an Entirely Hydrophilic Polyelectrolyte. DAVID HOAGLAND, ALEXEI POPOV, Univ. of Massachusetts Amherst — A new of class of polyelectrolyte ionenes is described, one with an entirely hydrophilic backbone of quaternized nitrogens connected by polyoxyethylene spacers of controlled length. The chemistry of these pegylated ionenes yields solubility at constant charge density in solvents of varying dielectric constant; it also allows for controlled variation of polyelectrolyte charge density through choice of monomers. Such features make the new ionenes ideal model polyelectrolytes on which to test theories for electrostatic properties of polyelectrolytes. In particular, we report on the use of electrophoresis to measure effective charge density for different charge spacings and dielectric constants. In conformance with previous results for aliphatic ionenes, we find counterion condensation for pegylated ionenes at conditions different than classical predictions. Counterion condensation – a constant effective charge density - is encountered in univalent electrolyte by the lowering of dielectric constant even when the dimensionless charge density is less than unity; conditions for the condensation depend on counterion identity (size). Additional studies on various anionic polyelectrolytes dissolved in nonaqueous solvents reproduce the same trends, suggesting their universality.

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