Abstract Submitted
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Phase Separation in Charge-Stabilized Colloids: Influence of Nonlinear Screening[1] ALAN R. DENTON, North Dakota State University — A range of experiments provide evidence that suspensions of like-charged colloids can separate into macroion-rich and -poor phases at low salt concentrations. An apparently related phenomenon is predicted by theories that map the mixture of macroions and microions (counterions and salt ions) onto an effective one-component system and include a one-body volume energy in the effective Hamiltonian[2,3]. Theoretical studies of charged colloids commonly assume that electrostatic interactions between macroions are linearly screened by microions. However, as recently shown within the framework of response theory[4], nonlinear microion screening induces triplet attractions, weakens pair repulsions, and modifies the volume energy. Taking these nonlinear interactions as input to a thermodynamic perturbation theory, equilibrium phase diagrams for aqueous suspensions of highly charged colloids are computed. The main conclusion: nonlinear effects do not suppress, and can even promote, the predicted phase separation of deionized suspensions.

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