

Reentrant Behavior in Attractive Interactions between Like-Charged Colloidal Particles Immersed in an Electrolyte Solution: a Theoretical Study and a Simple Picture

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The effective interaction between two like-charged colloidal particles immersed in an electrolyte solution was studied using HNC-OZ theory, an integral equation theory for liquid structure, with a particle model for the ions and solvent molecules. We examined conditions under which the Coulomb interaction was greater than the thermal energy. Although the colloidal particles repelled each other in a dilute electrolyte solution, a strong effective attraction between colloidal particles occurred in a medium concentration electrolyte. The coil -- globule transition of DNA and related phenomena are discussed based on the calculated reentrant behavior.