Poster 8

Particle Interactions and the Role of Electrolytes and Microgels

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The interactions between three different polystyrene latex dispersions, having different particle sizes, with electrolytes of different valency have been examined. Each latex dispersion was studied experimentally and a series of stability profiles for each combination of latex plus electrolyte were derived. Several experimental measurements including determination of particle hydrodynamic diameter, electrophoretic mobility and zeta potential were made in order to investigate inter-particle interaction. The largest particle size latex required the lowest electrolyte concentration to cause an aggregation of the particles when dispersed in the presence of monovalent electrolytes. This is attributable to an increase in the van der Waals attractive force with increasing particle size. All three particulate dispersions were however found to aggregate at similar concentrations of electrolyte when dispersed in the presence of divalent and trivalent ions. The experimental data was then subjected to theoretical analysis using DLVO theory. The analysis showed that the stability of all of the latex dispersions decreased as the valency of cations in the electrolyte increased. This can be attributed to a greater compression of the electrical double layer with increasing cation valency. A good correlation exists between the experimental results and theoretical predictions for the mono-valent electrolytes. The DLVO model requires further refinements to fully explain the influence of multivalent electrolytes on particulate dispersions.

The three anionic latex dispersions were mixed separately with cationic poly (N-isopropyl acrylamide) microgel particles. The stability of the resultant mixed particle dispersions was determined above and below the volume phase transition temperature (VPTT) of the microgel particles.