

PC.20 Influence of the Colloidal Stability of Latex Particles on their Distribution in Drying Films

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The stability of colloids is well described by the well-known DLVO theory. In a drying latex film, the polymer colloids are initially stable. However, their stability is expected to decrease with both increasing ionic concentration and decreasing particle-particle spacing, as the dispersion becomes more concentrated with the evaporation of water. Here, the stability of latex dispersions is systematically varied by adjusting the ionic concentration. These effects are explored experimentally by obtaining magnetic resonance (MR) profiles in a charge-stabilised latex with varying salt concentration [NaCl]. When the as-received latex is dried, a shallow and linear water concentration gradient is observed. In a latex with [NaCl] = 0.09 M, halfway through the drying process, a top layer with a lower water concentration develops near the film surface, which is attributed to the packing of particles. This result can be explained by the developments of particle flocs having a lower diffusivity, making them more likely to be concentrated near the moving boundary at the surface of the film.

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