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Effect of Sodium Dodecyl Sulfate and Sodium Chloride on the Stability of Aqueous Dispersions of TiO₂ Particles Against Aggregation and Sedimentation

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ABSTRACT

Dispersions of TiO₂ particles are widely used as the main pigment in white inks for inkjet printers due to its brightness and high opacity. The TiO₂ particles, however, have a high density, and so the possible fast settling of these particles can cause maintenance problems for the printers and lower the printing quality. We studied the effect of sodium dodecyl sulfate (SDS), a commonly used dispersant, on the stability of 1 wt% TiO₂ aqueous dispersions, both with and without NaCl, against aggregation and sedimentation. The sedimentation half time (t_{50}), defined as the time need for the particles to sediment from an initial sample height of 1 cm to 0.5 cm, was determined for various SDS concentrations. t_{50} was found to first increase with an increase in SDS concentration, reach a plateau upon further increases in concentration, and then rapidly decrease for SDS concentrations above a critical value. A similar trend was observed in 100 mM NaCl, though the transitions in t_{50} occurred at different SDS concentrations. Particle sizes were measured using dynamic light scattering, both before and after redispersion of the sediment to the same or different SDS concentrations. These measurements confirm that coagulation, no aggregation and then flocculation occurs as the SDS concentration is increased, indicating the effect of micelles in the dispersion stability at high enough SDS concentrations.

KEYWORDS

Dispersion stability, aggregation, sedimentation, sedimentation half time

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