M CHABNI, H BOUGHERRA, H LOUNICI, T AHMED-ZAÏD, JP CANSELIER

Evaluation of the Physical Stability of Zinc Oxide Suspensions Containing Sodium Poly-(acrylate) and Sodium Dodecylsulfate

2011) Journal of Dispersion Science and Technology 32 (12), 1786-1798, 2011
: http://dx.doi.org/10.1080/01932691.2011.616361

ABSTRACT:

The physical stability of zinc oxide (ZnO) aqueous suspensions has been monitored during two months by different methods of investigation. The suspensions were formulated with ZnO at a fixed concentration (5 wt%), sodium poly-(acrylate), as a viscosifier, and sodium dodecylsulfate (SDS), as a wetting agent. The rheological study shows that the suspensions exhibit a non-Newtonian, most often shear-thinning behavior and their apparent viscosity increases with polymer concentration. The rheograms of most of the ZnO suspensions do not vary during the experimental period. The viscoelastic properties of these suspensions, such as elastic or storage modulus (G′), viscous or loss modulus (G″) and phase angle (δ) were also examined. For% strains lower than 10%, all the formulations show strong elastic properties (G′ > G″, δ varies between 5 and 15°). Beyond 10% strain, the rheological behavior changes progressively from elastic to viscous (G″ > G′ for % strain >80%). Consistently, δ increases and reaches the 50-70° zone. Multiple light scattering (back-scattered intensity), measured with the Turbiscan ags, was used to characterize suspension physical stability (early detection of particle or aggregate size variations and particle/aggregate migration phenomena).

Suspensions containing 0.4 and 0.6 wt% polymer remain stable and macroscopically homogeneous, without being affected by the change of particle size observed with a laser particle sizer. Sedimentation tests, pH, and f potential measurements versus time, also confirmed these findings.