

Coupling Static Multiple Light Scattering Technique With the Hansen Approach to Optimize Dispersibility and Stability of Particle Dispersions

Authors : Guillaume Lemahieu, Matthias Sentis, Giovanni Brambilla, Gérard Meunier

Abstract : Static Multiple Light Scattering (SMLS) has been shown to be a straightforward technique for the characterization of colloidal dispersions without dilution, as multiply scattered light in backscattered and transmitted mode is directly related to the concentration and size of scatterers present in the sample. In this view, the use of SMLS for stability measurement of various dispersion types has already been widely described in the literature. Indeed, starting from a homogeneous dispersion, the variation of backscattered or transmitted light can be attributed to destabilization phenomena, such as migration (sedimentation, creaming) or particle size variation (flocculation, aggregation). In a view to investigating more on the dispersibility of colloidal suspensions, an experimental set-up for “at the line” SMLS experiment has been developed to understand the impact of the formulation parameters on particle size and dispersibility. The SMLS experiment is performed with a high acquisition rate (up to 10 measurements per second), without dilution, and under direct agitation. Using such experimental device, SMLS detection can be combined with the Hansen approach to optimize the dispersing and stabilizing properties of TiO₂ particles. It appears that the dispersibility and the stability spheres generated are clearly separated, arguing that lower stability is not necessarily a consequence of poor dispersibility. Beyond this clarification, this combined SMLS-Hansen approach is a major step toward the optimization of dispersibility and stability of colloidal formulations by finding solvents having the best compromise between dispersing and stabilizing properties. Such study can be intended to find better dispersion media, greener and cheaper solvents to optimize particles suspensions, reduce the content of costly stabilizing additives or satisfy product regulatory requirements evolution in various industrial fields using suspensions (paints & inks, coatings, cosmetics, energy).

Keywords : dispersibility, stability, Hansen parameters, particles, solvents

Conference Title : ICDCCP 2023 : International Conference on Dispersion Chemistry and Colloidal Particles

Conference Location : Madrid, Spain

Conference Dates : March 20-21, 2023