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Using Vesicular Dispersion for Stabilizing Suspensions of Dense Colloidal Particles against Sedimentation

Hanlin Zhu, An-Hsuan Hsieh, Prof Elias. I. Franses, and Prof. David. S. Corti
Davison School of Chemical Engineering, Purdue University

ABSTRACT

Colloidal dispersions, like inks and paints, are often required to remain stable for long times, i.e., the dispersed colloidal particles should remain suspended. In most cases, a stable dispersion requires preventing the agglomeration of the suspended colloidal particles. If the particles agglomerate, their sizes will increase and rapid sedimentation will occur. Nevertheless, many colloidal particles of commercial interest have high densities. Thus, they quickly settle even without agglomeration. One novel approach to preventing the settling of high density particles is the use of close-packed vesicular dispersions (CPVDs) made of the surfactant DDAB (didodecyldimethylamine bromide). Previous work demonstrated the ability of these CPVDs to prohibit the settling of high density titania particles. However, only a limited range of particle sizes that were found to remain stable with CPVDs were investigated. Also, the effects of the method of preparation of the CPVDs was not fully explored, as an effecitve CPVD should be generated from the smallest possible amount of added DDAB.

Thus, the impact of various preparation methods on the resulting properties of the DDAB vesicular dispersions are examined. DDAB vesicular dispersions are generated via stirring only to form primarily liposomes, sonication to break down large multi-layer vesicles, and extrusion through membranes to obtain specifically sized vesicles. Various light scattering and absorbance techniques are also used to probe the structure of the vesicular dispersions, important information needed for improving the ability of CPVDs to stabilize against sedimentation a broader range of colloidal particle sizes.

KEYWORDS

Vesicles, Dispersant, Colloidal dispersion