

Application Notes

Particle-Sizing/Lipid emulsions

Emulsions are widely used in the pharmaceutical, cosmetics, and chemical industries. One of the most important parameters in characterizing an emulsion is its particle size distribution. Emulsion particle size has a profound effect on the physical properties of the emulsion, as well as on its stability. The ability to characterize the distribution of sizes rapidly represents a powerful result for these investigations.

Combining the separation capabilities of cross flow field flow fractionation (FFF) with *on-line* size characterization using Wyatt Technology's DAWN DSP is the definitive technique for absolute emulsion quantitation. The fractionator separates the emulsion particles by size, after which the size of each eluting fraction is measured in real time by the DAWN. The ASTRA for Particles (fP) software package controls all the light scattering data collection and analysis.

ASTRA fP converts the collected light scattering data into root mean square (*rms*) particle size. Both number and mass fraction size distributions (differential and cumulative) are then generated from the light scattering data, *without* a concentration detector.

A lipid emulsion of cholesterol, phospholipid, and saponin was analyzed using the combined FFF/DAWN system. The resulting *rms* radii measured for each of the eluting fractions are shown in Fig. 1. This figure shows that the emulsion particles have *rms* radii ranging in size from approximately 15 to 40 nm. Figure 2 presents the differential mass fraction distribution computed from those data, indicating maximum around a radius of 20 nm, with a broad background to about 40 nm.

The ability to generate both number and mass fraction size distributions is essential for characterizing emulsions. The combined FFF-DAWN system allows this to be accomplished absolutely and with a minimum amount of sample preparation.

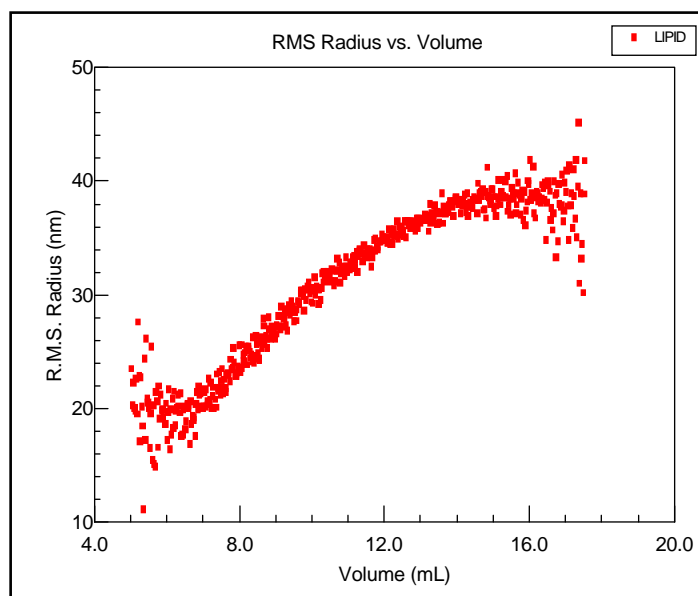


Figure 1. The rms radii measured for the entire particle size population of the emulsion.

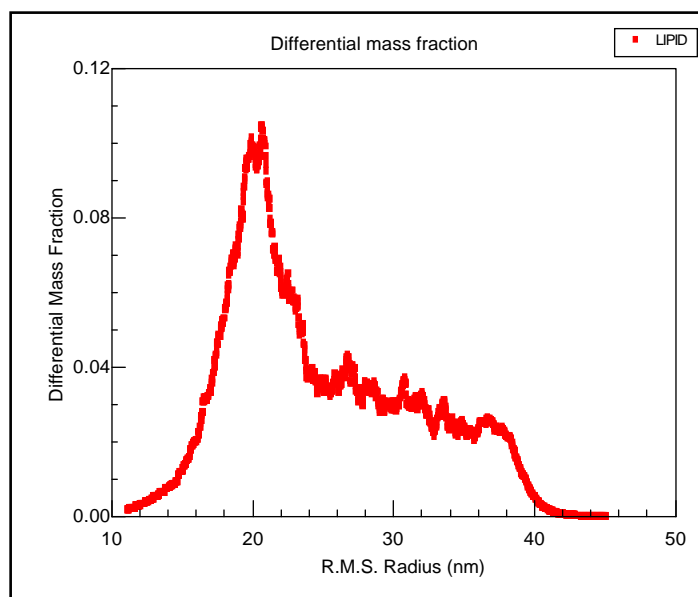
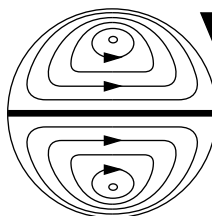


Figure 2. Differential mass fraction distribution calculated for the data in Fig. 1, without the need for a concentration detector.



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