PHARMACEUTICAL

Particle size measurement with S-MLS in **highly viscous media**

Introduction

Size determination of objects embedded in highly viscous media, such as gels, is very limited with Dynamic Light Scattering (DLS). This application note shows how Turbiscan® technology based on Static Multiple Light Scattering (SMLS) can easily and quickly determine the mean diameter of objects in a highly viscous medium in a range of 10nm to 1000µm. The example presented here, focuses on vesicles introduced into a biopolymer gel for pharmaceutical or cosmetic application (skin application).

KEY **BENEFITS**

FAST

NO DILUTION

SENSITIVE

Context

Thanks to the Stokes-Einstein relationship, the diffusion coefficient D_t of a particle can be measured with DLS. This coefficient is inversely proportional to the particle size d and the viscosity of the dispersant η.

$$D_t = \frac{k_b T}{3\pi\eta d}$$

with T, the absolute temperature and k_b the Boltzmann's constant.

For a constant size d, the diffusion coefficient strongly decreases with the increase of viscosity η. Thus, the particle size measurement duration with DLS becomes prohibitive for highly viscous media.

Therefore, the maximum measurable particle size with DLS strongly decreases while the viscosity increases as shown in Figure 1.

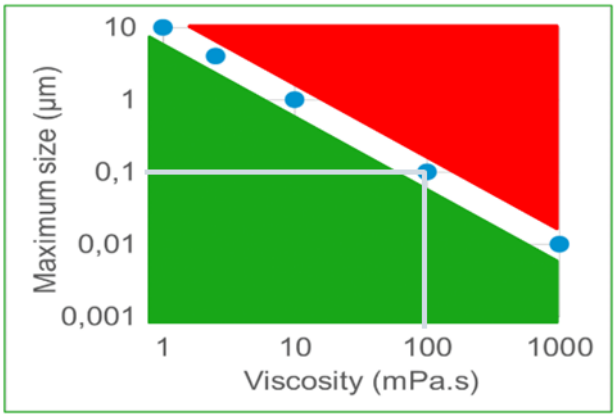

Figure 1: Maximum measurable particle size with DLS in function of the viscosity and for diluted media.

For example, in a 100 mPa.s solvent, the maximum measurable particle size is 100 nm as depicted by the white line in Figure 1.

For a viscosity equal to 1000 mPa.s, the DLS measurements are limited to only 10nm sized particles.