

USE OF SURFACTANTS IN THE DELOS[®] CRYSTALLISATION TECHNIQUE FOR THE PRODUCTION OF STABILIZED MICRO- AND NANO-PARTICLES

Santiago Sala, Nora Ventosa and Jaume Veciana*

Institut de Ciència de Materials de Barcelona (CSIC), Campus U.A.B., 08193-Bellaterra
(Spain)

There is increasing investment in new and more effective drug delivery systems because the acceptance of new drug formulations is expensive and slow, taking up to 15 years to obtain full accreditation for some drugs, with no guarantee of success. Pharmaceutical companies are keen to investigate new techniques that can more effectively deliver or target existing drugs, as this offers a new and less costly route to increasing their product portfolio.

Research into micro- and nano-particles of pure drugs has not been very extensive, although it is clear that unique properties of such particles warrant closer investigation. Not only their production is considered as a challenge, but also the improvement of their stability after the precipitation process is observed as a problem to resolve. This research will contribute to the development of new drug formulations as nano-suspensions for intravenous injection or as dry powders for pulmonary delivery, which in many cases are far more efficient than the conventional oral routes.

In previous works,¹ the DELOS[®] method has been successfully applied to the production of micron and sub-micron particles of materials of different nature. In this work, a step further is carried out in relation to the improvement of the control of the particle growth and the degree of agglomeration. Surfactants are employed as a barrier to prevent growth and aggregation in order to obtain better quality powders consisting of stabilized nanoparticles.

Specifically, the DELOS[®] crystallisation of cholesterol in acetone/CO₂ mixtures is performed introducing the surfactant TWEEN 80 as a new component of this systems. The characterization of the materials in terms of particle size distribution, morphology and crystallinity is shown. The effect of surfactant concentration is studied in relation to the particle characteristics and product stability.

¹ N. Ventosa, S. Sala, J. Torres, J. Llibre, J. Veciana, *Crystal Growth and Design*, **2001**, *1*, 299.