

Continuous production of homogeneous vesicular systems using compressed fluids. Scale-up of the DELOS-susp method for the preparation of liposomal and quatsuv[®] formulations.

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Abstract

One of the main challenges for the production of advanced materials is the successful implementation of new manufacturing nanotechnologies at industrial scale.

The DELOS-susp platform is a compressed fluid-based technology that allows the reproducible preparation of colloidal systems with remarkable physic chemical characteristics, in terms of homogeneity and particle size, and a high versatility to integrate different active compounds. This platform allows the formulation of innovative nanoconjugates for therapeutic and diagnostic applications. [1]

In the present work we evaluated the scalability of the DELOS-susp platform using a Quality by Design approach, a methodology that is encouraged by the FDA and the EMA to develop robust drug manufacturing methods and controls. [2] The process was first deeply studied in batch configuration. Two known vesicular systems were scaled-up, from the milliliter to the liter scale: liposomes and quatsuvs -a new class of small unilamellar vesicles composed by cationic surfactants and sterol-like molecules.[3] Then, the effect of different process parameters on the characteristics of the resulting vesicles was evaluated, allowing the definition of Critical Process Parameters for both systems. Finally, a continuous pilot plant configuration was designed and set up, and the production of liposomal and quatsuv formulations was evaluated and compared to those obtained in the batch configuration. The results obtained showed the viability of a continuous production of different formulations by DELOS-susp process, with great flexibility.

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