

ABSTRACT**Effects of Freeze Drying and Spray Drying as Drying Methods on the Characteristics and Physical Stability of Micelles***Literature Review*

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Micelles are nano-sized colloidal dispersions made from amphiphilic molecules, with hydrophobic tails and hydrophilic heads. The hydrophobic core act as a reservoir to entrap hydrophobic drugs which are stabilized by the hydrophilic surface. Therefore, micelles can be used to improve drug delivery which has low solubility. It is known that in liquid form, the micelle systems are physically and chemically unstable upon a long period of storage. Thus, these micelles could be made into solid forms to enhance their long-term stability by freeze drying (FD) or lyophilization and spray drying (SD). This literature review aims to discover the effects of freeze drying and spray drying on the characteristics and physical stability of micelles. The articles used in the review were obtained from PubMed and ScienceDirect. The results concluded showed that the size of micelles after undergoing FD and SD processes was greater than the size of micelles before drying, the zeta potential of the micelles carried out by FD and SD were in the range of $-36.6 \pm 4.03 - +1.74$ mV which indicates that the micelle systems are stable, micelles have a spherical morphology and the solids formed after drying are amorphous. However, different powder characteristics were obtained, FD produced cake-like solids while SD produced fine powder solids. SD also has a lower drying yield compared to FD. The stability tests carried out by each article showed that both FD and SD drying processes can improve the long-term stability of micelles.

Keywords: micelles, stability, freeze drying, lyophilization, spray drying