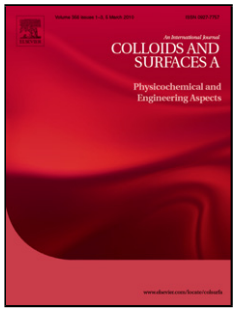

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Influence of dermal formulation additives on the physicochemical characteristics of catanionic vesicles

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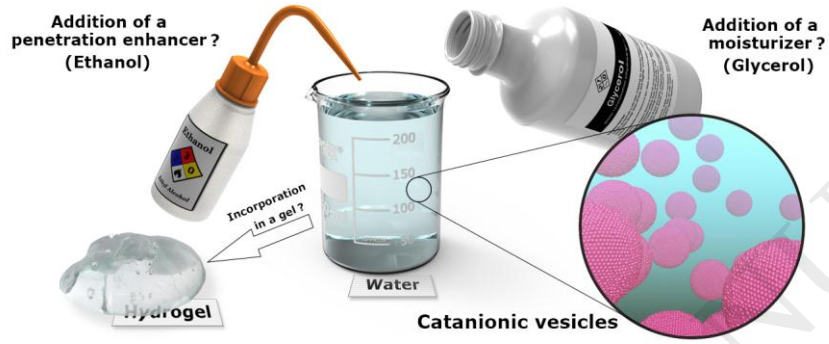
Graphical abstract



Abstract

In this article sugar-derived catanionic vesicles were successfully formulated as potential carriers for dermal drug delivery. Results showed that vesicles are able to form even in the presence of certain permeation enhancers or moisturisers such as ethanol or glycerol. These additives can even be used as tools to modify the nanocarriers' physicochemical properties, especially the membrane fluidity which will be a key parameter to cross the stratum corneum. The addition of a hydrophilic thickening polymer, namely hydroxyethyl cellulose (HEC), allowed to reach the optimal texture for topical applications while maintaining the vesicles' ability to encapsulate active species. Furthermore, it offers the advantage of greatly stabilising the system in time, making it ready for future dermal formulations.

Introduction

The past few decades have seen great advances in the field of drug delivery, as it allows active species protection and targeting to specific sites of action [1]. Among the many systems that exist, vesicular nanocarriers have drawn much attention [2–4]. Indeed, drugs of various hydrophilicity can be encapsulated with high loading capacity and their membrane can be a key factor in order to cross physiological barriers. However, classical vesicular systems, such as phospholipid-based liposomes, often show disadvantages hindering their industrial development. A few of these drawbacks are raw materials cost, and lengthy preparation methods which require many steps and specific equipment [5,6].

Catanionic vesicles are a viable solution to address these issues [7–10]. In these systems, catanionic surfactants, arising from the association of two oppositely charged amphiphiles, spontaneously self-aggregate into objects when placed in aqueous solution. By carefully choosing their structure, it is