

Design and Characterization of Hybrid-Multistratified Micro/Nanoemulsions for Wound Healing

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The current challenge of scientific research is the design of advanced wound care in order to obtain a rapid and complete healing of chronic wounds avoiding serious complications. At this purpose, a great deal of attention has been paid to Carvacrol (CRV), a monoterpene and one of the main components of the Origanum, Thymus and Satureja Montana essential oils. Despite its promising properties in wound treatment [1], CRV exhibits high lipophilicity, rapid oxidation and volatilization, and inadequate retention time at the site of action, which limit its therapeutic application. A possible technological strategy would be CRV encapsulation in micro/nanoemulsions (M/NEs). Therefore, in this research work we used CRV itself both as the oil phase and as the active compound for the design of O/W M/NEs.

CRV-M/NEs uncoated or coated by Chitosan were prepared and deeply characterized. In particular, stability studies were carried out in order to observe some parameters such as dimensions, ζ -Potential, pH and CRV amount at different temperature over 90 days. Furthermore, size values obtained by DLS analyses were compared with data obtained by TEM observations. Secondly, two clay minerals (a montmorillonite and a sepiolite, VHS and PS9 respectively) were added to the M/NEs in order to increase the final viscosity, thus obtaining a semisolid formulation (Figure 1). The rheological properties of the formulations, provided adding the clay minerals, were also studied. Finally, CRV release and in vitro cell compatibility on human fibroblast have been performed.

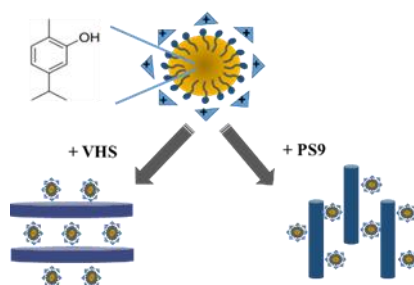


Figure 1. Representative scheme of Chitosan coated M/NEs with two clays minerals, VHS and PS9.

[1] Costa, M. F., et al., Effects of Carvacrol, Thymol and essential oils containing such monoterpenes on wound healing: a systematic review, J Pharm Pharmacol, 2019.

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