

Benzophenone-3 loaded Microemulsion for a Potential Use as Sunscreen. Thermal Stability and Permeation Analytical Studies [†]

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Abstract: Benzophenone-3 (BP-3) is a UVA-B liposoluble absorber that may undergo thermal degradation with decreased efficiency in sunscreens. Microemulsions can protect labile compounds against thermal degradation. This research proposes a BP-3 loaded microemulsion (ME-BP3) based on the use of biocompatible materials and the evaluation of its thermal stability and permeation dynamics. BP-3 was loaded (2.0% w/w) into a microemulsion consisting of tween 80-ethanol (42.0% w/w), isopropyl myristate (2.5% w/w), and water (55.5% w/w). The particle size was 11.90 nm, and the polydispersity index was 0.224. The thermal degradation study was performed at 60°C and monitored by synchronous fluorescence spectroscopy (350-690 nm) for 80 min. The fluorescent signal for ME-BP3 was constant over time. However, the signal for BP-3 in a non-organized medium decreased over time ($k=1.26 \text{ h}^{-1}$). The permeation of BP-3 was monitored by UV-Vis (290 nm) using an online system. The permeation constant (k_p) was $4.07 \times 10^{-6} \text{ cm min}^{-1}$, a lower value than a BP-3 in a non-organized medium ($1.45 \times 10^{-6} \text{ cm min}^{-1}$). The proposed carrier for BP-3 was successfully obtained and offered a higher thermal stability and a lower permeation rate compared to BP-3 in a non-organized medium. These results are promissory for the potential use of ME-BP3 as sunscreen.

Keywords: microemulsion; benzophenone-3; thermal degradation; permeation study.

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Conflicts of Interest

The authors declare no conflict of interest.