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Non-Ionic surfactants and the photostability of Avobenzone: Implications for sunscreens

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Highlights

Physical-chemical studies on Avobenzone photostability. Avobenzone in the presence of non-ionic surfactants for application in sunscreens.

Resumo/Abstract

Avobenzone (AVO) is a widely used compound in sunscreens for its ability to absorb UVA radiation, present on the Earth's surface and ranges from 320 to 400 nm. Long-term exposure can cause damage to the dermis and epidermis due to the photooxidation of leuco-melanin, which can lead to the development of skin cancer. The protection offered by AVO occurs in its enolic form (E), however, like most organic filters, the exposure to solar radiation leads to the conversion of the enolic form to the keto form (K), generating photoallergic and cytotoxic photodegradation products, affecting its effectiveness and impacting the user's health.

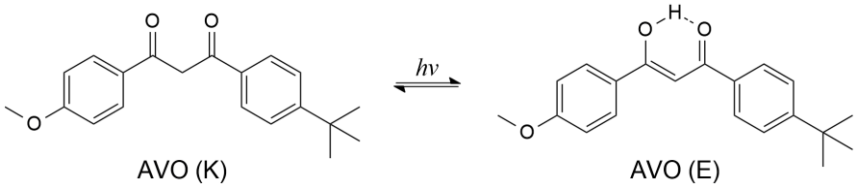

Figure 1. Keto-enol tautomerism of Avobenzone

Thus, the photostability of AVO was evaluated in the presence of nonionic surfactants, already used in cosmetics as emulsifiers and antibacterials. The surfactants Tween 80, Pluronic® P-123, PEG-35, and PEG-40 (1% w/v) were used in the photodegradation tests. The absorption spectra of UV-Vis spectra were registered after specific periods of time, and the degradation kinetics were adjusted to first-order models. It was observed that AVO presented greater stability and lower photodegradation rate (k) in the presence of PEG-40 and in the presence of P-123, highlighting them as a potential additive in sunscreen formulations due to its better performance. To evaluate the preferential photostability, the binding constant of AVO with the different surfactants (K_b) was evaluated through the absorption intensity of AVO at different concentrations of the surfactants. The binding order was P-123>PEG-35>PEG-40>Tween 80.

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