



CHEMICAL SUNSCREEN FORMULATIONS STABILITY AND IN VITRO DELIVERY

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Purpose

The aim of this study is to verify the photostability, the thermal stability and the possibility of permeation effect of two chemical sunscreens, commonly used – para-aminobenzoic acid (PABA), a strong absorber of UVB radiation, and 2-hydroxy-4-methoxy-benzophenone (Eusolex 4360) employed as an UVB-UVA absorber.

Methods

Two sunscreen preparations were made:

- hydroalcoholic solution: 5 g of PABA in 45 g of ethanol added to 9 g of tween 20 in 41 g of water.

- lipid solution: 5 g of Eusolex 4360 in 50 g of isopropylmyristate.

The stability studies were carried out using a Shimadzu UV spectrophotometer, in the range of 240-400 nm. The sunscreen solutions were left for 20 days at room temperature (approx. 20°C) at light and 20 days at 40°C in an oven.

Spectrophotometric readings were made at the beginning of the study, after the first 20 days, and then 4, 8 and 20 days after being left in the oven.

Results

During the first 20 days of the stability study, at 20°C and light, the PABA solution turned into a light yellowish colour. However, neither its absorption spectrum, after 20 days, nor that of Eusolex 4360, showed any differences when compared with the initial ones.

There was a little drop in the absorbance values of PABA preparation after 8 days at 40°C, but reached 42% at the end of 20 days (Fig.1).

For the Eusolex preparation a drop of 20% was detected at the end of 8 days at 40°C and remained constant until the end of the study (Fig.2).

The sunscreen concentrations obtained in the in vitro release studies are shown in the Fig. 3.

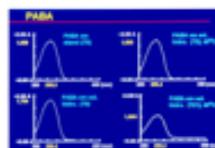


Fig. 1 - Absorption spectra of PABA solution under 40°C

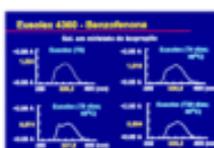


Fig. 2 - Absorption spectra of Eusolex 4360 solution under 40°C

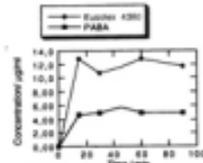


Fig. 3 - Release profiles of PABA and Eusolex 4360 from solution

Conclusions

These temperature conditions intended to reproduce the maximum aggression an user can put on a sunscreen preparation. Therefore the drop obtained does not imply a bad stability of the products. A PABA derivative can be used to prevent oxidation even under such extreme conditions.

In vitro studies pretend to simulate what happens in the skin, assessing the partition of sunscreens between a lipid medium and an aqueous one. The sunscreen concentrations in the reception fluid showed that a small penetration can occur. The greatest was for Eusolex 4360. This may be the cause of the allergic reactions mentioned by some authors

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