In vitro SPF Testing

Utilisation
The SPF in vitro is useful for comparative purposes, particularly R & D. However, it is formulation type and substrate interaction dependent, and, as such, should not be relied upon as a substitute for In vivo SPF testing.

Principle
A film of sunscreen sample is applied to a supporting substrate. The absorbance is measured in the range 290nm to 400nm. Using the SPF contribution values published by C.I.E, the in-vitro SPF is calculated.

Materials and Equipment
Labsphere 2000 Spectrophotometer fitted with integrating sphere and customised software.
Helioscreen HD 6 5cm x 5 cm Moulded PMMA Plates.

Experimental Design
The absorbance of a sunscreen product applied on a PMMA Moulded Slide at 1.3 mg.cm\(^2\) are measured between 400nm and 290nm and compared to the absorbance of the substrate or blank cell. Using these values in a calculation the in vitro SPF is determined. Determine the in-vitro SPF using the values provided in the CIE Table. These values are derived from the reference action spectrum adopted by the Commission on Illumination (CIE).

Calculation
The in vitro SPF is determined by the calculation as indicated below, according to Diffey and Robinson 1989 (3.1).

\[
SPF = \frac{\sum E(\lambda) \cdot \omega(\lambda) \cdot PF(\lambda)}{\sum E(\lambda) \cdot \omega(\lambda)}
\]

where \(E(\lambda)\) = spectral irradiance of terrestrial sunlight under defined conditions.
\(\omega(\lambda)\) = erythemal effectiveness of UVR at wavelength \(\lambda\) in producing delayed erythema in human skin.
\(PF(\lambda)\) = protection factor

References
International Commission on Illumination “A reference action Spectrum for ultraviolet induced erythema in human skin”.
3. DESOP - 036 Procedure for in vitro SPF Determination.

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