

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.

Experimental Design

The absorbance of a sunscreen product applied on a quartz slide covered with transpore tape at 2mg/cm sq., 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).

Materials and Equipment

Shimadzu UV-2450 Spectrophotometer fitted with integrating sphere
UVPC Series software
Quartz Slides 7.5 cm * 2.5 cm
3M Transpore Tape

Calculation

The *in vitro* SPF is determined by the following calculation according to Diffey and Robinson 1989 (3.1).

$$SPF = \frac{\sum_{290}^{400} E(\lambda)\epsilon(\lambda)}{\sum_{290}^{400} E(\lambda)\epsilon(\lambda) / PF(\lambda)}$$

where $E(\lambda)$ = spectral irradiance of terrestrial sunlight under defined conditions.

$\epsilon(\lambda)$ = erythema effectiveness of UVR at wavelength λ nm in producing delayed erythema in human skin.

$PF(\lambda)$ = protection factor

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).

References

1. Journal of the Society of Cosmetic Chemists, Vol.40, pp127-133 (1989).
2. CIE Journal 6, 17-22 (1987) International Commission on Illumination "A reference action Spectrum for ultraviolet induced erythema in human skin".
3. DESOP - 036 Procedure for *in vitro* SPF Determination.