

Sun Protection Factor (SPF)



Introduction

The SPF value indicates the level of sunburn protection provided by the sunscreen product. All sunscreens are tested to measure the amount of UV radiation exposure it takes to cause sunburn when using a sunscreen compared to how much UV exposure it takes to cause a sunburn when not using a sunscreen.

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Website
klab.im

Tel
+82-042-932-7586

Contact
mint5135@klab.im

Instrument and Materials

$$SPF = \frac{MED \text{ (with sunscreen)}}{MED \text{ (without sunscreen)}}$$

Where,

MED = minimal erythema dose

Erythema = sunburn or redness caused by engorgement of capillaries

Procedures

1. Dilute 1 g of sunscreen with 25 ml ethanol.
2. Degas solution in ultrasonic bath for 5 min.
3. Homogenize sample after paper filtration.
4. Measure blank with ethanol.
5. Measure absorption value at intervals of 5 nm wavelength of 290-320 nm

Calculations

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs(\lambda)$$

Where,

CF = correction factor (10)

EE = erythmogenic effect

Abs = absorbance

Constant value

Wavelength (λ)	$EE(\lambda) \times I(\lambda)$
290	0.0150
295	0.0817
300	0.2874
305	0.3278
310	0.1864
315	0.0837
320	0.0180
Total	1

Reference

[1] FDA, Sun Protection Factor (SPF)

[2] Fonseca, A. P., and N. Rafaela. "Determination of sun protection factor by UV-vis spectrophotometry." *Health Care 1.1* (2013): 1000108.

[3] Fawwaz, Muammar. "Sun Protection Factor Activity of Unregistered Facial Cream in Makassar City." *International Journal of Chemical Concepts* 3.4 (2017): 342-346.