

Quality control of solar protection films via design of experiments

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Introduction

Solar radiation reaching the earth surface is broadly divided into infrared, visible and ultraviolet radiation (UVR). Individual dosimetry and monitoring of the sun rays in humans and environments is of interest since in homes, shops and cars the effects of UVR radiation can bring irreparable damage to the skin and eyes. The efficacy of solar protective films has been recognized as an important public health product. The objective of this work was the quality control of solar films using the UV-Vis spectroscopy technique via 2^k Experimental Factor.

Methods

Four types of solar protective films were tested: G05, G20, G35 and WB (Windom Blue), which follow the blocking of UVR rays by 95%, 80%, 65% and 0% (76% transparent). The samples had dimensions of 1.0 x 3.0 cm² and the readings were taken on a GENESYS™ 10S UV-Vis Spectrophotometer with an optical step of 1 nm from 190 nm to 400 nm. The absorbances were used in a 2^k Experimental Factor, in which the four films were read individually and also with overlap (two films together). It was possible to obtain results of all the interactions among the films, with or without overlap.

Results

The results about the absorption of the sunscreen films were modeled from the 2^k Experimental. This factor indicates that the best regions of the spectrum are blocked and/or where they produce a better quality control of these materials. The region studied in this work was where the ultraviolet radiation dosimetry can be of interest. The proposed spectrophotometric method is rapid, simple and cost effective for the evaluation on quality control of protection films.

Conclusions

The results provide information on ultraviolet radiation and they can be useful for the medical physics community. The proposed methodology may be useful as a rapid quality control tool. It can be used during the production process, in the analysis of the final product, and can offer important information for the scientific community.