



Determination of Inorganic Elements in Sunscreen by Using Energy Dispersive X-Ray Fluorescence

Fábio L. MELQUIADES ^{1*}, Carlos R. APPOLONI ², Audrey S.G. LONNI ³,
Diogo D. FERREIRA ² & Fábio LOPES ²

¹ State University of Center-West /Department of Physics, P.O.Box 3010,
Zip Code 85015-430 - Guarapuava – PR – Brazil

² State University of Londrina /Department of Physics, Laboratory of Applied Nuclear Physics,
P.O.Box 6001, Zip Code 86051-990 Londrina – PR - Brazil

³ State University of Londrina /Department of Pharmaceutical Sciences

SUMMARY. Nowadays there are no official *in vitro* methods to determine TiO₂, ZnO or other inorganic elements in sunscreen cosmetics. The objective of this work is to determine the concentration of several inorganic elements in sunscreen composition, without sample preparation, by employing a portable Energy Dispersive X-Ray Fluorescence (EDXRF) device. Particularly in the case of TiO₂ and ZnO, the aim is also to estimate their Sun Protection Factor (SPF) due to the physical protection barrier. A sensitivity curve for the determination of inorganic elements in sunscreen, with atomic numbers ranging from 19 to 35, is presented. Fifteen commercial samples with different SPF from different brands were analyzed. It was determined TiO₂ and ZnO concentrations with their respective SPF values, as well as to detect the presence of K, Br, Sr and Ce in the sunscreen samples by identifying and quantifying chemical elements that had not been mentioned in the formulations.

KEY WORDS: Energy dispersive X-ray fluorescence, Inorganic elements, Sunscreen.

* Author to whom correspondence should be addressed. E-mail: fmelquiades@unicentro.br