

## New calculation of $L_1$ subshell yields fluorescence of heavy elements

Y. Sahnoune<sup>a,b,c\*</sup>, A. Kahoul<sup>a,b</sup>, Y. Kasri<sup>d</sup>, B. Deghfel<sup>e,f</sup>, D.E. Medjadi<sup>c</sup>,

<sup>a</sup>Department of Materials Science, Faculty of Sciences and Technology, Mohamed El Bachir El Ibrahimi University, Bordj-Bou-Argeridj 34030, Algeria.

<sup>b</sup>Laboratory of Materials Physics, Radiation and *Nanostructures* (LPMRN), University of Mohamed El Bachir El Ibrahimi, Bordj-Bou-Argeridj 34030, Algeria.

<sup>c</sup>Physics Department, L'école Normale Supérieure Vieux-Kouba, 16000 Algiers, Algérie.

<sup>d</sup>Theoretical Physics Laboratory, Physics Department, University of Bejaia, Algeria.

<sup>e</sup>Department of Physics, Faculty of Sciences, University of Mohamed Boudiaf, 28000 M'sila, Algeria.

<sup>f</sup>Laboratory of materials physics and their applications, Physics Department, Faculty of Sciences, University of Mohamed Boudiaf, 28000 M'sila, Algeria.

\*e-mail address: [sahnoun.y34@gmail.com](mailto:sahnoun.y34@gmail.com)

### Abstract

The analytical methods based on X-ray fluorescence have a great importance for a number of practical applications in a variety of fields including atomic physics, X-ray fluorescence surface chemical analysis, medical research and treatments (such as cancer therapy) and industrial irradiation processing. In this contribution, a summary of experimental data published in the period of time between 1955 to february-2016 was presented in a tabular form for  $L_1$  subshell fluorescence yields ( $\omega_{L_1}$ ) taken from different sources. First, a critical examination of these data using the *weighted average values*  $\omega_{L_1-w}$  was presented. Then, an interpolation using the famous analytical function  $(\omega_{L_1-w} (1 - \omega_{L_1-w}))^{1/4}$  vs the atomic number  $Z$  was performed to deduce a new empirical  $L_1$  subshell fluorescence yields for elements in the range  $70 \leq Z \leq 96$  [1-3]. At last, our calculated empirical  $L_1$  subshell fluorescence yields have been compared with other theoretical and empirical values reported in the literature.

**Keywords:**  $L_1$  subshell fluorescence yields, weighted average values, empirical fluorescence yields