DETERMINATION OF K TO L VACANCY TRANSFER PROBABILITIES

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X-ray fluorescence (XRF) spectrometry is used world-wide. The most established technique is energy dispersive X-ray fluorescence (EDXRF) for quantitative analysis because it is relatively inexpensive and requires less technical effort to run the system. EDXRF is very useful for determination XRF parameters such as production cross sections, fluorescence yields, intensity ratios and vacancy transfer probabilities. Atomic K-shell vacancies are filled by two major independent decay modes: the radiative transitions and radiationless transitions. The study of vacancy transfer from one shell to another or within the subshell has been of experimental as well as theoretical interest in recent years. Accurate values of vacancy transfer probabilities are needed in nuclear and atomic processes. The number of L shell vacancies produced per decay of K shell vacancy is known as K to L vacancy transfer probability (η_{KL}). There are various methods for the determination vacancy transfer probabilities. Generally, the vacancy transfer probabilities are determined by measuring K X-ray intensity ratios or L X-ray production cross sections. In the present work, K X-ray and L X-ray line intensities for samples have been measured by using an EDXRF spectrometry. The samples were irradiated with gamma photons of energy 59.5 keV from Am-241. The K and L X-rays from the sample were detected by collimated a Si(Li) detector. The determined values of K to L vacancy transfer probabilities using these parameters are compared with the theoretically calculated values using radiative and radiationless transitions.