Evaluation of Fluorescence yields of Gold induced by proton

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Synopsis Evaluation of Fluorescence yield provides a platform to interpret the atomic properties of matter in an appropriate way. Calculations have been performed for Fluorescence yield of Gold (Au) bombarded by protons in the low energy regime. Multiple ionization (MI) effect is employed along with prevailing theoretical models for ionization. The calculated results are compared with the experimental measurements.

The correctness of the data regarding atomic parameters like Fluorescence yield and Coster-Kronig probability is an important aspect in the atomic and nuclear physics. These parameters are tremendously influenced by a significant effect known as multiple ionization (MI) or outer shell ionization. It is the phenomena of ejection of several electrons of the target in the strong coulomb field of the projectile [1]. Study of the outer shell ionization is of current interest [2,3]. According to this effect the vacancies created in the shells which are above L shells alters the Fluorescence yield and Coster-Kronig probability. These parameters are used to extract X-ray production cross sections. So their alteration also effect (a) X-ray energies and (b) X-ray intensity ratio. Moreover, due to the existence of multi-vacancies in the higher shell reduced the nuclear charge and increases the binding energy of all energy levels.

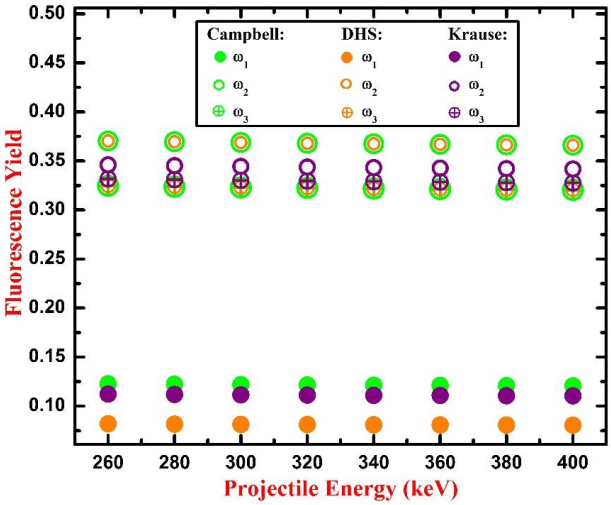

Figure 1. Variation of Fluorescence yield for Au as a function of proton energy.

This results in a shifting of X-ray peak toward the high energy region. Banas *et al.* [4] shows that changes in both width and position of X-ray peak are the most reliable outcome of outer shell ionization. Theoretical method [5] has been applied to look over these yields in an appropriate manner so as to account this effect. Literature survey explores this effect (MI) copiously for heavy charge particles rather for the lighter charge particles [6,7].

On account of MI effect, the resulted modified values of ω and *f* have been calculated and their variation with projectile energy has been analyzed over the energy range 260 – 400 keV with an interval of 20 keV (see Figures1 and 2). The detailed results will be discussed in the conference.

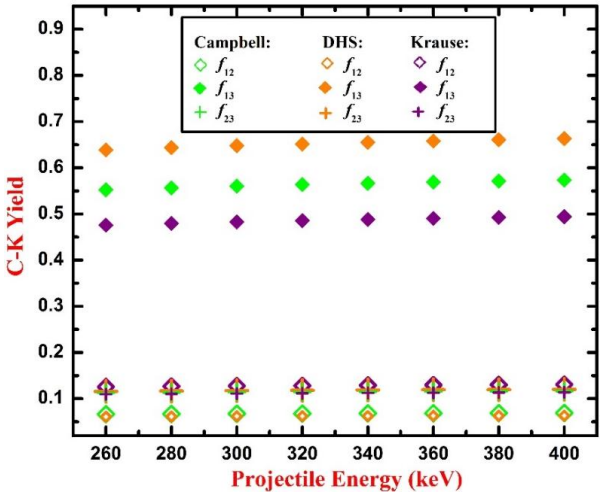

Figure 2. Variation of Coster-Kronig yield for Au as a function of proton energy.

References

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