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Kerala University, C. P. GIRIJAVALLABHAN. Dept. of Physics, K. VENKATESWARLU. Alwaye-4, December 7, 1967.


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**K-SHELL PHOTOELECTRIC CROSS-SECTIONS OF 145 keV GAMMA-RAYS IN VARIOUS ELEMENTS**

By using the technique of measuring the absolute yield of fluorescent K-radiation following the ejection of K-shell electrons when a target is irradiated with gamma-rays, we have extended our earlier measurements\(^1\)\(^-\)\(^3\) to 145 keV gamma-rays. In addition to the photoelectric interaction, the K-radiation may also be produced by the Compton scattering of gamma-rays from K-shell electrons and the ionization caused by photo and Compton electrons. Compton scattering cross-sections from K-shell electrons has been found by many investigators\(^4\)\(^-\)\(^6\) to be equal to that from free electrons and contribution of this effect comes out to be of the order of 1%. Using the data of Rester and Dance\(^7\) the contribution of K-shell ionization by photo and Compton electrons was calculated and found to be less than 0.5%. The contribution of both these effects is within our experimental error and thus our results are essentially for the photoelectric interaction.

The experimental technique used is the same as reported earlier.\(^1\)\(^-\)\(^2\) A 100 cm. strong source of Ce\(^{141}\) was used for 145 keV gamma-rays and a graded absorber was placed at the mouth of source slit to absorb 36 keV X-rays coming from the internal conversion in Ce\(^{141}\). A 2.5 cm. dia. \(\times 2.5\) cm. height NaI(Tl) spectrometer was used to measure the intensity of K-shell X-rays following the photoelectric interaction. Targets of lead, gold, tungsten, tin and silver were in the form of metallic foil, each of radius 1-2.5 cm. Holmium (Ho\(_2\)O\(_3\)), dysprosium (Dy\(_2\)O\(_3\)) and barium (Ba\(_2\)SO\(_4\)) were used in powdered form filled uniformly in thin aluminium caps covered with a fine cellulose tape layer. Target thickness was varied from 0.04 to 0.40 gm./cm.\(^2\). The K-shell photoelectric cross-sections were calculated from the measured yield of the K-shell X-rays by applying geometrical and other corrections such as solid angle, self-absorption in the target, detection efficiency of X-rays\(^8\) and gamma-rays,\(^9\) fluorescent yield,\(^10\) etc., as explained earlier.\(^1\)\(^-\)\(^3\) The results obtained are shown in Fig. 1 along with the theoretical results of Hubbel and Berger.\(^1\)\(^1\) Agreement with theory is good within the range of experimental uncertainty.

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![Fig. 1. K-shell photoelectric cross-sections versus atomic number. Curve represents the values of Hubbel and Berger.](image)

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