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#### INELASTIC SCATTERING OF 280 keV PHOTONS BY K-SHELL ELECTRONS OF LEAD, TUNGSTEN AND TIN

INELASTIC scattering of a photon by an electron is described by Klein-Nishina formula where it is assumed that the struck electron is initially free and at rest. However, the effect of electron binding has to be considered for low energy photons and for inner shell electrons where the incident photon energy is comparable with the binding energy of the electron. There have been some investigations<sup>1-5</sup> of inelastic scattering of gamma rays by K-shell electrons, but most of these measurements are confined to high energy photons. In order to obtain data at lower energies we have measured the differential K-shell Compton scattering cross-sections of 280 keV photons from lead, tungsten and tin at a scattering angle of 90°.

When a photon is Compton scattered by an electron bound in the K-shell of the atom, the electron is ejected from its orbit and a K X-ray is emitted with a certain probability defined by the K-shell fluorescence yield. The experiment consists of measuring the intensity of scattered photons in coincidence with the K X-rays, thus eliminating the scattering taking place from electrons of other shells. The beam of 280 keV photons is obtained by collimating the radiations from 2 curie <sup>203</sup>Hg source. Gamma rays and X-rays are detected with 51 mm and 2 mm thick NaI (TI) scintillation detectors respectively. The X-ray detector is placed at 90° to the scattering plane to minimize detector to detector scattering. The resolving time of the coincidence set-up is of the order of 35 n sec. The measurements are made for the elements of lead, tungsten and tin at

a scattering angle of 90°. The measured coincidence counts are corrected for (i) chance coincidence, (ii) multiple scattering, (iii) bremsstrahlung radiation and K-shell X-rays produced by photo and Compton electrons, (iv) cosmic ray background and (v) photons scattered from one detector to other detector.

The results obtained are in the form of ratio of differential scattering cross-section of K-shell electron ( $d\sigma_K$ ) to that of free electron ( $d\sigma_f$ ) and are shown in the column III of Table I. Theoretical results<sup>6</sup> calculated on the basis of non-relativistic wave function of K-shell electron in the hydrogen like atom are shown in column IV. While for lead and tungsten there is agreement with theory within experimental error, for tin the measured cross-section is rather large.

TABLE I  
Differential cross-section ratio  $d\sigma_K/d\sigma_f$  for 280 keV photons at 90°

Element	Z	$(d\sigma_K/d\sigma_f)_{\text{exp.}}$	$(d\sigma_K/d\sigma_f)_{\text{th.}}$
Lead	82	$0.308 \pm 0.045$	0.300
Tungsten	74	$0.401 \pm 0.047$	0.366
Tin	50	$1.037 \pm 0.051$	0.803

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#### SOME HISTOPATHOLOGICAL AND HISTOCHEMICAL OBSERVATIONS IN THE TESTICULAR TISSUES OF VASECTOMIZED AND CAUDECTOMIZED RAMS\*

BILATERAL vasectomy and caudectomy are dependable surgical methods for making teaser rams which are extensively employed in sheep husbandry. Basic physiopathological changes have been investigated histochemically in dog<sup>1</sup> and man<sup>2</sup> in order to evaluate the long term effects.

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