

PERFORMANCE OF PEN DOSEMETERS IN LOW ENERGY X RADIATION FIELDS*

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1. Introduction. The pen dosimeters are specially important for individual radiation monitoring because they allow direct and rapid exposure measurements. Three kinds of pen dosimeters, designed A, B and C (different manufactures), were tested in low energy X radiation fields (radiation protection level) of the Calibration Laboratory of São Paulo, in order to verify their energy dependence.

2. Materials and Methods. Two pen dosimeters were each time simultaneously exposed to X radiation with energies varying between 15.7 and 37.6 keV. They were irradiated free in air for the energy dependence study and in front of a PMMA phantom (30x30x15 cm) with the objective to establish the backscattering contribution to their responses. All of them were tested in both studies in five different standard radiation qualities.

3. Results. The dosimeters of type A and C presented the highest radiation sensitivity of the investigated energy range. Short-term stability tests were performed and the results depend on the dosimeter type and the energy: the highest and lowest variations were obtained respectively for the type C pens (15% and 15.7 keV) and type B pens (0.93% and 37.6 keV). All dosimeters presented high energy dependence, varying for type B pens between 98% (15.7 keV) and 64% (37.6 keV). In the case of the backscattering response contribution study with the phantom the type C pens showed the largest values (45%, 15.7 keV). These high values are probably due to their strong radiation sensitivity.

4. Conclusion. The obtained results showed consistency with literature data. All tested pen types must be used very carefully for X radiation detection in the investigated low energy range using convenient correction factors.

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**EXTRAPOLATION CHAMBER RESPONSE IN LOW ENERGY
 X RADIATION STANDARD THERAPY BEAMS***

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1) Introduction - Measurements of absorbed dose rates produced by beta or low-energy X radiation are often difficult to obtain with accuracy. The recommended instruments for these measurements are the extrapolation chambers. A plane parallel ionization chamber of variable air volume of this type was designed and constructed; its performance was tested in the radiation standard beams of the Calibration Laboratory of São Paulo.

2) Materials and Methods - The chamber has a collecting electrode and a guard-ring of graphite. Teflon was used as insulating material between the electrode and the guard-ring. The entrance window is made of aluminized Mylar (0.84 mg.cm^{-2}) of superficial density.

3) Results - The performance of the chamber was studied in relation to its response linearity and energy dependence. Extrapolation curves were initially obtained for X-rays (25 and 50 kV), varying the interelectrode distance between 0.2 and 1.0 mm and keeping the electric field constant at 10 V/mm. The calibration factors were obtained. The chamber response linearity was verified varying the X-rays tube current between 2 and 30 mA, for 25 and 50 kV. Measurements were also taken for 25, 30, 40, 45 and 50 kV, keeping the interelectrode distance and the electric field constant at 1.00 mm and 10 V/mm. An energy dependence of 5.2% was observed between 25 and 50 kV.

4) Conclusion - The obtained results are comparable to those of commercial plane parallel chambers.

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