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ENERGY DEPENDENCE OF SINTERED PELLETS OF Al_2O_3 IN THERAPEUTIC BEAMS OF X RADIATION*

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1. Introduction. Due to its low cost, good mechanical resistance, easy handling and linearity in a wide dose range, the thermoluminescent properties of aluminium oxide (Al_2O_3) in different forms (pure and doped) concerning the radiation detection have been investigated over the past years. Sintered pellets of aluminium oxide were used in this work in order to verify the possibility of its use for dosimetry in therapeutic beams of X radiation.
2. Materials and Methods. Calcined alumina powder was used to obtain sintered pellets of Al_2O_3 (8 mm diameter and 1 mm thickness). The dosimetric characteristics were determined irradiating the samples with a ^{60}Co gamma source and therapy X-rays systems. The pellets were irradiated free in air and in front of a Lucite phantom. A Harshaw Nuclear Systems, model 3000, TL analyser was used for the TL readout, reaching maximum temperatures of 300°C, with a linear heating rate of 5°C/s.
3. Results. The performance of the Al_2O_3 sintered pellets was tested in relation to its energy dependence for X-rays and the values were normalized to ^{60}Co. The TL response was measured of samples exposed to 1 Gy in X radiation beams of 20 to 60 kV and 100 to 300 kV. The maximum energy dependence was reached for 25 keV (effective energy). The dose backscattering contribution due to the phantom presence was also determined in all the tested energy range.
4. Conclusion. The obtained results show the feasibility of the Al_2O_3 pellets for dosimetry in radiotherapy beams.

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MEASUREMENTS OF ABSORBED DOSE DISTRIBUTIONS IN SMALL CIRCULAR BEAMS OF 10 MV X-RAYS

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In order to calculate the absorbed dose distributions in small volumes irradiated by narrow circular x-ray beams, several quantities have been measured: tissue phantom ratios (TPR), dose profiles and the total scatter correction factors (S_t). The radiation unit used is a Clinac 18 (Varian) accelerator with auxiliary collimators to produce 10 MV x-ray beams of diameters from 1 cm to 3 cm. Measurements have been made using different types of detectors.
RESULTS: The **TPR** have been measured in a PMMA phantom with a 2536 NE chamber of 0.03 cm^3. The normalization depth of 8 cm (water equivalent) has been taken. The TPR are a slowly varying function of field size, the depth of maximum TPR is between 2.2 cm for the collimator of 1 cm and 2.5 cm for 3 cm collimator.
The **dose profiles** have been measured in a water phantom with a semiconductor detector at several depths, Kodak XV films were used also. The dose profile dependence on depth was found to be negligible.
The **total scatter correction factor** of each collimator were defined as the ratio between the absorbed dose at the reference depth (8 cm) and the absorbed dose at the same depth in a square field of 8x8 cm^2. These factors have been determined using ionization chamber, LiF detectors, photographic films and semiconductors. A strong dependence on the field size is observed, the factors being in a range from 0.65 to 0.91.
The influence of the size detector on the determination of these parameters will be discussed in the poster.