

Low cost electron irradiator using $^{90}\text{Sr}+^{90}\text{Y}$ sources

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In beta therapy, β particles from $^{90}\text{Sr}+^{90}\text{Y}$ are used for the prevention and treatment of ophthalmological and dermatological diseases. For such purposes, the radiation dose is deposited by planar and concave applicators positioned on the region to be treated. Although this therapy is effective on the diseases, several complications have been reported, making these types of radioactive applicators obsolete in current clinical practice. This paper proposes a methodology to prepare and evaluate the safety of a research irradiator that re-purposes and adapts dermatological and ophthalmic $^{90}\text{Sr}+^{90}\text{Y}$ applicators. The irradiator was constructed using low cost materials and three applicator sources. The sources are positioned at the center and upper end of acrylic rectangular prisms. Radiochromic film was used to obtain the dose distribution on the sample holder surface. Pellets of aluminum oxide doped with carbon ($\text{Al}_2\text{O}_3:\text{C}$) were used to evaluate the reproducibility of the irradiator. The MCNPX Monte Carlo code was used for the evaluation of safety conditions. The irradiator exhibits good reproducibility of irradiation of dosimeters in pellet form and is safe to handle.

Keywords: Irradiator, low cost, electron, pellets

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