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Dosimetric Characterization of DSF/NaOH/IA-PAE/R. spp. Phantom Material for Radiation Therapy
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Abstract

Background: Different compositions of DSF/NaOH/IA-PAE/R. spp. composite particleboard phantoms were constructed. **Methods:** Photon attenuation characteristics were ascertained using gamma rays from ¹³⁷Cs and ⁶⁰Co. Absorbed doses at the location of an ionization chamber and Gafchromic EBT3 radiochromic films were calculated for high-energy photons (6 and 10 MV) and electrons (6, 9, 12, and 15 MeV). **Results:** The calculated TPR_{20,10} values indicate that the percentage discrepancy for 6 and 10 MV was in the range of 0.29–0.72% and 0.26–0.65%. It was also found that the relative difference in the (Formula presented.) to water and solid water phantoms was between 1.08–1.28% and 5.42–6.70%. The discrepancies in the determination of PDD curves with 6, 9, 12, and 15 MeV, and those of water and solid water phantoms, ranged from 2.40–4.84%. Comparable results were found using the EBT3 films with variations of 2.0–7.0% for 6 and 10 MV photons. Likewise, the discrepancies for 6, 9, 12, and 15 MeV electrons were within an acceptable range of 2.0–4.5%. **Conclusions:** On the basis of these findings, the DSF/NaOH/IA-PAE/R. spp. particleboard phantoms with 15 wt% IA-PAE addition level can be effectively used as alternative tissue-equivalent phantom material for radiation therapy applications. © 2023 by the authors.

Author Keywords

absorbed dose; dosimetric properties; IA-PAE; radiation therapy; tissue-equivalent phantom

Index Keywords

Dosimetry, Gamma rays, Ionization chambers, Photons, Radiotherapy, Tissue; Absorbed dose, Dosimetric properties, IA-PAE, Phantom materials, Phantoms, Photon attenuation, Solid water, Tissue-equivalent phantoms, Water phantom, Water-water; Phantoms

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