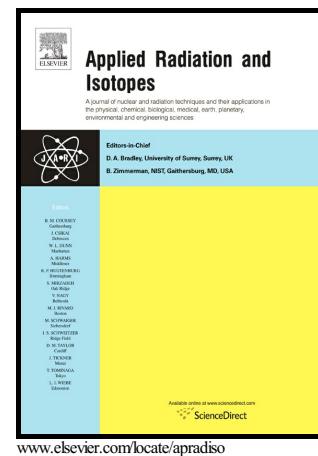


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Water-equivalence of gel dosimeters for radiology medical imaging

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Abstract

International dosimetry protocols are based on determinations of absorbed dose to water. Ideally, the phantom material should be water equivalent; that is, it should have the same absorption and scatter properties as water. This study presents theoretical, experimental and Monte Carlo modeling of water-equivalence of Fricke and polymer (NIPAM, PAGAT and itaconic acid ITABIS) gel dosimeters. Mass and electronic densities along with effective atomic number were calculated by means of theoretical approaches. Samples were scanned by standard computed tomography. Photon mass attenuation coefficients and electron stopping powers were examined. Theoretical, Monte Carlo and experimental results confirmed good water-equivalence for all gel dosimeters. Overall variations with respect to water in the low energy radiology range (up to 130kVp) were found to be less than 3% in average.

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