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M. Valente, J. Vedelago, D. Chacón, F. Mattea, J. Velásquez, P. Pérez



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# Water-equivalence of gel dosimeters for radiology medical imaging

M. Valente<sup>1,2,3</sup>, J. Vedelago<sup>1,2</sup>, D. Chacón<sup>2,4</sup>, F. Mattea<sup>2,5,6</sup>, J. Velásquez<sup>7,8</sup>, P. Pérez<sup>1,2</sup>

<sup>1</sup>Instituto de Física Enrique Gaviola - CONICET. (Av. M. Allende s/n, 5000, Córdoba, Argentina, valente@famaf.unc.edu.ar)

<sup>2</sup>Laboratorio de Investigación e Instrumentación en Física Aplicada a la Medicina e Imágenes por Rayos X, Universidad Nacional de Córdoba. (Av. M. Allende s/n, 5000, Córdoba, Argentina)

<sup>3</sup>Centro de Física e Ingeniería en Medicina - CFIM & Departamento de Ciencias Físicas, Universidad de La Frontera. (Av. Francisco Salazar 1145, Casilla 54-D, Temuco, Chile)

<sup>4</sup>Departamento de Física, Universidad Nacional, Heredia, Costa Rica. (Avenida 1, Calle 9. Apartado Postal: 86-3000, Heredia, Costa Rica)

<sup>5</sup>Universidad Nacional de Córdoba. Facultad de Ciencias Químicas. Departamento de Química Orgánica. Córdoba, Argentina

<sup>6</sup>Instituto de Investigación y Desarrollo en Ingeniería de Procesos y Química Aplicada, IPQA, CONICET. Córdoba, Argentina

<sup>7</sup>ICOS Inmunomédica. (Lago Puyehue 1750, Temuco, Chile)

<sup>8</sup>Universidad Mayor. (Av. Alemania 0281, Temuco, Chile)

## 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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