

AbstractID: 1389 Title: Investigation of the radiological properties of normoxic polymer gel dosimeters

The radiological properties of MAGIC, MAGAS and MAGAT normoxic polymer gel dosimeters (De Deene 2002) have been investigated. The radiological water equivalence was determined by comparing the polymer gel macroscopic photon and electron interaction cross sections over the therapeutic energy range of 0.01 MeV to 20 MeV. The parameters investigated were the mass attenuation and energy absorption coefficients (μ/ρ , μ_{en}/ρ) and electron mass stopping powers and scattering powers (S/ρ , T/ρ). The normoxic polymer gels are shown to be water equivalent to within 3% for absolute interaction characteristic ratios while they are to within 2% for density scaled ratios with the exception of energies below 0.1 MeV in the photoelectric effect range, for mass attenuation and energy absorption coefficients where the differences were greater. Due to their high gelatine and monomer concentration normoxic polymer gels have a greater physical density (kg m^{-3}) than other types of gel dosimeters such as Fricke gels and PAG polymer gels resulting in differences between the radiological interaction properties of the normoxic polymer gel and water. Depth dose profiles were calculated using the EGS4 Monte Carlo code for a 6MV photon beam. The depth dose profiles were all within 1% of each other for an absolute comparison with water and within 4% for a relative comparison. The results show that the MAGAT formulation is the most water equivalent of the normoxic polymer gels investigated.

De Deene Y, Hurley C, Venning A *et al* 2002. *Phys. Med. Biol.* 47 3441–3463.