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POLYMETHACRYLIC GEL (PMAG) AS A POINT DOSIMETER

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ABSTRACT

Polymethacrylic gel (PMAG) of different concentrations of MAA and BIS werenirradiated using ã-rays produced by 60Co radionuclide with the absorbed doses ranging from 0 Gy to 19 Gy. Due to the radiation-induced polymerization processes, the formation of Polymethacrylic gel (PMAG) occurs, which causes the dose response mechanism increased in the Nuclear Magnetic Resonance (NMR) relaxation rates of protons. The relaxation rate R2 (1/T2) are fitted to the functional form y as a function of absorbed dose D was found to have a monoexponential expression in the form; .....= + . ..1 0 0DDy y A e . The relaxation rate (ÄR2) dose sensitivity value (12.5 + 0.1 Gy) of MAA monomer by Lepage, et al 2001 is comparable with PMAAG experimental value gained which are 12.6 + 0.1 Gy. The dose sensitivity, D0 and half dose, D1/2 was found increasing with the concentrations of MAA monomer and BIS crosslinker. The slope parameter kBIS > kMAA indicates that consumption of crosslinker is much faster than monomer. Eventually, UV-Vis spectrophotometer was used to record PMAG degree of absorption. The PMAG has a mean value of absorption of 0.614 at 375 nm. The dose derived from PMAG is comparable to Fricke dosimeter and ionization chamber readings between 4.7 ± 0.1% and 11.6 ± 0.1%. The dose errors of less than 10 ± 0.1% are considered acceptable in radiation processing, an improvement of accuracy less than 5.0 ± 0.1% is acceptable in radiotherapy. This effort is to undertake the study of precision and accuracy associated with the use of Fricke and polymer gel in optimizing the usage of gels for dosimetry.

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