Poly(vinyl alcohol) and Poly(N-vinyl-2-pirrolidone) / Poly(ethyleneglicol) Hydrogels Produced by Ionizing Radiation Technique for Drug Delivery

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The interest in the preparation of biocompatible hydrogels by radiation polymerization with advantageous properties has increased considerably in recent years due to their versatile applications in biomedicine, biotechnology, pharmacy, agriculture and controlled release of drugs. Examples are poly(vinyl alcohol) (PVAl) and poly(N-vinyl-2-pirrolidone) (PVP) polymers due to its specific characteristics for biomedical applications. Hydrogels matrices for particular drug-release applications was investigated with the synthesis of modified polymeric hydrogel of PVAl, poly(N-viny-2-pirrolidone) (PVP) and poly(ethylene glycol) (PEG 300). They were processed using gamma radiation from Cobalt-60 source at 25 kGy dose. The characterization of the hydrogels was conducted and toxicity was evaluated. The dried hydrogel was analyzed by differential scanning calorimetry (DSC), thermogravimetry analysis (TGA), infrared spectroscopic analysis (FTIR), swelling and gel determination. The membranes have no toxicity and sol-gel content reveal the reticulation degree. In contrast to ionizing radiation membranes described in the literature and formulated with PVAl/PEG, our new membranes composed with PVAl/PVP/PEG/ÁGAR are more flexible and presents higher swelling capacity. The influence of PEG was observed in the swell up of the equilibrium. The hydrogel matrix with 0.5% of PEG has lower swelling than the matrix with 2.0 and 4.0%. The decrease of gel fraction results is associated to an increase of PEG concentration. The PEG concentration tolerance is higher in the membranes gamma irradiated comparing with the freezing-thawing method in which was observed diffusion of PEG at concentration higher than 2%. A drug will be incorporated into hydrogels structures using a range of well-established chemicals.

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