CHARACTERIZATION OF PVP HYDROGEL SYNTHESIZED BY E-BEAM FOR DRUG DELIVERY SYSTEM

Heloísa Augusto Zen [1]*, Daniela Farias Cabral [1], Ademar Benévolo Lugão [1]
[1] Instituto de Pesquisas Energéticas e Nucleares (IPEN-CNEN/SP)
* Corresponding author: Helozen@gmail.com

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Introduction and objective

The synthesis of poly(vinylpyrrolidone) (PVP) hydrogels induced by radiation is a well-known process to obtain an intramolecular crosslinking and with a high degree of purity. The PVP is a polymer with affinity to water which is an ideal to increase the efficiency of water radiolysis from radiation process and consequently to create free radicals to initiate chain reactions in solutions. The objective of this study is evaluating the performance of PVP hydrogel encapsulated with different drugs for a drug delivery system.

Methodology

PVP-K-90 was prepared with ultra-pure water at room temperature and constant stirring after that, the solution prepared was submitted to electron beam radiation at 10 kGy of total dose, under inert atmosphere. After radiation processes, the drugs were added to this solution at 5µg.mL^{-1} and lyophilized. In this study was incorporated ivermectin and nitazoxanide. The characterization was carried out before and after the drug incorporation to determine the changes in the hydrogel developed. The techniques used were dynamic light scattering (DLS), thermal analysis, microscopy and FTIR.

Results and discussion

The drugs ivermectin and nitazoxanide were chosen, because both act as antiparasitic. The hydrodynamic radius of nitazoxanide drug incorporated into PVP is 60.22nm and of ivermectin drug incorporated is 64.48nm. The thermal analysis revealed the stability in both developed hydrogels indicating the cohesion between PVP and the drugs and no loss water was observed, which indicates that the lyophilization was completed. The superficial structure was observed by microscope. By FTIR was possible to attribute from PVP at ~3400 cm^{-1} (O–H stretch), ~2900 cm^{-1} (C–H stretches), and ~1400 cm^{-1} (C–H deformations).

Conclusions

PVP hydrogels were successfully synthesized using electron beam radiation. The particle size was determined by DLS and no change was observed after drug incorporation, both showed a nanoparticle size. The obtained results demonstrated a promising use these hydrogels for drug delivery system as an alternative to the use of synthetic pills.

References

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